Dell™ Dimension™ E520 Service Manual

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Notes, Notices, and Cautions

NOTE: A NOTE indicates important information that helps you make better use of your computer.

NOTICE: A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

CAUTION: A CAUTION indicates a potential for property damage, personal injury, or death.

If you purchased a Dell™ n Series computer, any references in this document to Microsoft® Windows® operating systems are not applicable.

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Model DCTA

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Before You Begin

Dell™ Dimension™ E520 Service Manual

- Getting Started
- Recommended Tools
- Turning Off Your Computer
- Before Working Inside Your Computer

Getting Started

This manual provides procedures for removing and replacing the components in your computer. Unless otherwise noted, each procedure assumes that the following conditions exist:

- You have performed the steps in Turning Off Your Computer and Before Working Inside Your Computer.
- You have read the safety information in your Dell™ *Product Information Guide.*
- A component can be replaced by performing the removal procedure in reverse order.

Recommended Tools

The procedures in this document may require the following tools:

- Small flat-blade screwdriver
- Phillips screwdriver
- Flash BIOS update program (download)

Turning Off Your Computer

NOTICE: To avoid losing data, save and close any open files and exit any open programs before you turn off your computer.

1. Shut down the operating system:
   a. Save and close any open files, exit any open programs, click the **Start** button, and then click **Shutdown**.
   b. In the **Shut Down Windows** window, select **Shut down**.

   The computer turns off after the operating system shutdown process finishes.
2. Ensure that the computer and any attached devices are turned off. If your computer and attached devices did not automatically turn off when you shut down your operating system, press and hold the power button for 4 seconds.

Before Working Inside Your Computer

Use the following safety guidelines to help protect your computer from potential damage and to help ensure your own personal safety.

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: Handle components and cards with care. Do not touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a processor by its edges, not by its pins.

NOTICE: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell is not covered by your warranty.

NOTICE: When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before you disconnect the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, ensure that both connectors are correctly oriented and aligned.

NOTICE: To avoid damaging the computer, perform the following steps before you begin working inside the computer.

1. Turn off your computer. See Turning Off Your Computer.

NOTICE: To disconnect a network cable, first unplug the cable from your computer, and then unplug it from the network port or device.

2. Disconnect any telephone or telecommunication lines from the computer.
3. Disconnect your computer and all attached devices from their electrical outlets, and then press the power button to ground the system board.

NOTICE: Before touching anything inside your computer, ground yourself by touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate any static electricity that could harm internal components.

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About Your Computer

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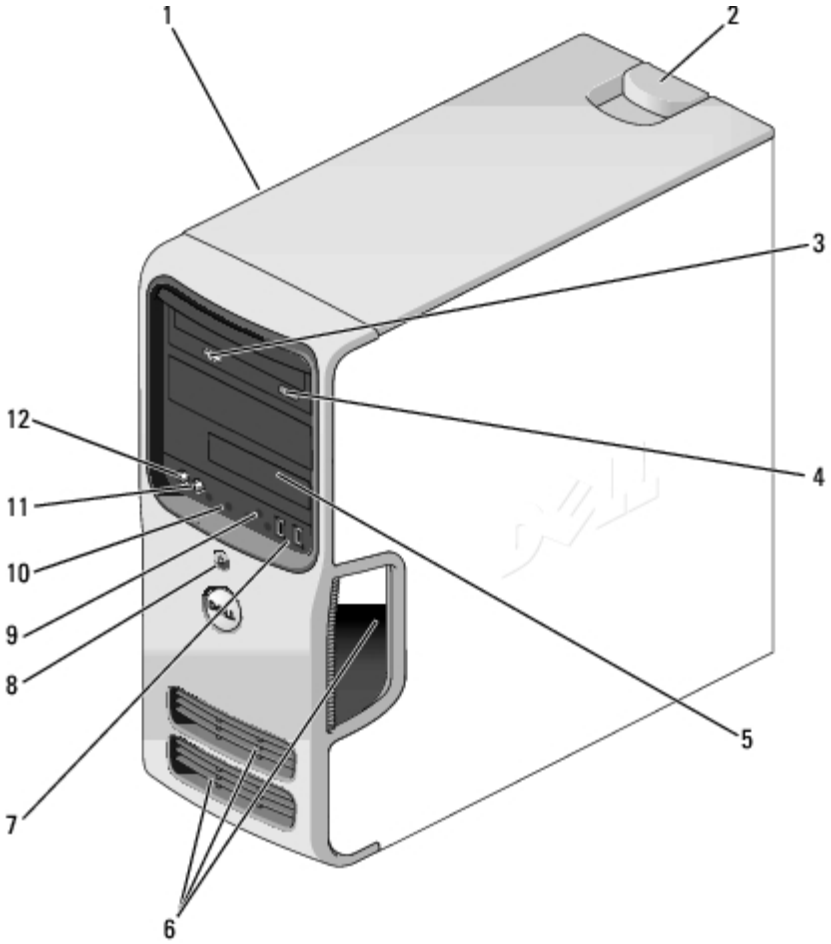
- Front View of the Computer
- Back View of the Computer
- Back Panel Connectors

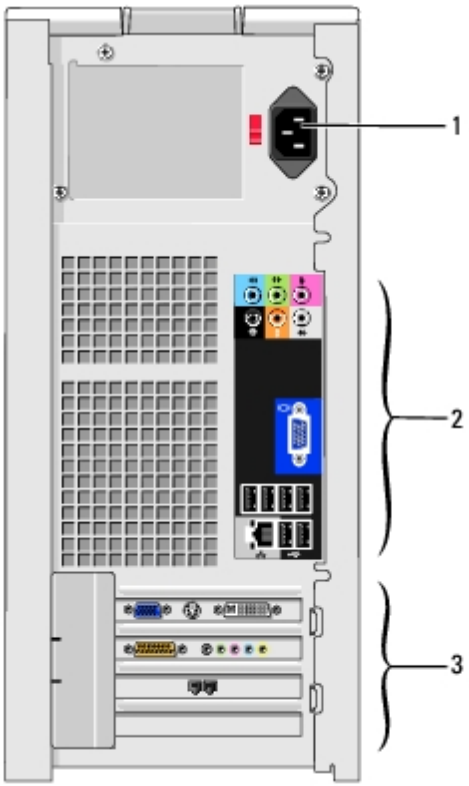
Front View of the Computer



1	Service Tag	Use the Service Tag to identify your computer when you access the Dell Support website or contact support.
2	cover release latch	Use this latch to remove the cover.
3	CD or DVD activity light	The CD or DVD drive light is on when the computer reads data from, or writes data to the CD or DVD drive.
4	CD or DVD eject button	Press the CD or DVD eject button to eject a disc from the CD or DVD drive.
5	FlexBay	Can contain an optional floppy drive or optional Media Card Reader.

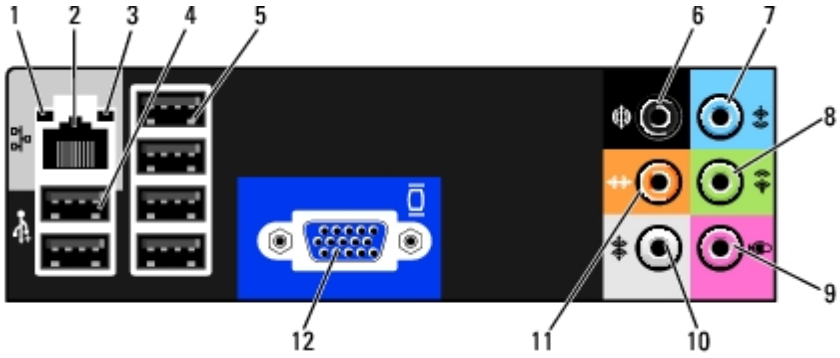
	drive	
6	vents	For adequate cooling, do not block any of the vents. **NOTICE:** Ensure that there is a minimum of two inches of space between all vents and any objects near the vents. **NOTICE:** Keep the vent area clean and dust-free to ensure that the system is adequately ventilated. Use only a dry cloth to clean the vent area to avoid water damage to the system.
7	USB 2.0 connectors (2)	Use the front USB connectors for devices that you connect occasionally, such as flash memory keys, cameras, or bootable USB devices. For more information on booting to a USB device see System Setup Options. **NOTE:** It is recommended that you use the back USB connectors for devices that typically remain connected, such as printers and keyboards.
8	power button	Press the power button to turn on the computer. **NOTICE:** To avoid losing data, do not use the power button to turn off the computer. Instead, perform an operating system shutdown.
9	hard drive activity light	The hard drive light is on when the computer reads data from or writes data to the hard drive. The light may also be on when a device such as a CD player is operating.
10	diagnostic lights (4)	Use the sequence of the diagnostic lights to help you troubleshoot a problem with your computer (see Diagnostic Lights).
11	headphone connector	Use the headphone connector to attach headphones and most kinds of speakers.
12	microphone connector	Use the microphone connector to attach a personal computer microphone for voice or musical input into a sound or telephony program.

Back View of the Computer



1	power connector	Insert the power cable.
2	back I/O connectors	Plug USB, network, VGA monitor, and audio devices into the appropriate connectors (see Back Panel Connectors).
3	card slots (4)	Access connectors for installed PCI or PCI Express cards.

Back Panel Connectors



1	link integrity light	• Green — A good connection exists between a 10-Mbps network and the computer. • Orange — A good connection exists between a 100-Mbps network and the computer. • Yellow — A good connection exists between a 1000-Mbps (1-Gbps) network and the computer. • Off — The computer is not detecting a physical connection to the network.
2	network adapter connector	**NOTICE:** Do not plug a telephone cable into the network connector.

		Use the network adapter connector to attach your computer to a network or broadband device. Connect one end of a network cable to either a network jack or your network or broadband device, and then connect the other end of the network cable to the network adapter connector on your computer. A click indicates that the network cable has been securely attached. On computers with an additional network card, use the connectors on the card and on the back of the computer when setting up multiple network connections (such as a separate intra- and extranet). **NOTE:** It is recommended that you use Category 5 wiring and connectors for your network. If you must use Category 3 wiring, force the network speed to 10 Mbps to ensure reliable operation.
3	network activity light	Flashes a yellow light when the computer is transmitting or receiving network data. A high volume of network traffic may make this light appear to be in a steady "on" state.
4	USB 2.0 connectors (2) (rear dual)	Use the back, rear-dual USB connectors for devices that typically remain connected, such as printers and keyboards. **NOTE:** It is recommended that you use the front USB connectors for devices that you connect occasionally, such as joysticks, cameras, or bootable USB devices.
5	USB 2.0 connectors (4) (rear quad)	Use the back, rear-quad USB connectors for devices that typically remain connected, such as printers and keyboards. **NOTE:** It is recommended that you use the front USB connectors for devices that you connect occasionally, such as joysticks, cameras, or bootable USB devices.
6	surround sound connector	Use the (black) surround sound connector to attach multichannel-capable speakers. On computers with a sound card, use the connector on the card.
7	line-in connector	Use the (blue) line-in connector to attach a record/playback device such as a cassette player, CD player, or VCR. On computers with a sound card, use the connector on the card.
8	line-out/headphone connector	Use the (green) line-out connector to attach headphones and most speakers with integrated amplifiers. On computers with a sound card, use the connector on the card.
9	microphone connector	Use the (pink) microphone connector to attach a personal computer microphone for voice or musical input into a sound or telephony program. On computers with a sound card, use the connector on the card.
10	side surround sound connector	Use the (gray) side surround sound connector to attach multichannel-capable speakers. The side-surround output provides enhanced surround audio for computers with 7.1 speakers. On computers with a sound card, use the connector on the card.
11	center/subwoofer LFE connector	Use the (orange) center/subwoofer connector to attach a center speaker or a single subwoofer. On computers with a sound card, use the connector on the card. **NOTE:** The LFE (Low Frequency Effects) Audio channel, found in digital surround sound audio schemes, carries only low frequency information of 80 Hz and below. The LFE channel drives a subwoofer to provide extremely low bass extension. Systems not using subwoofers can shunt the LFE information to the main speakers in the surround sound setup.

12	VGA connector	Use the integrated video connector to attach your video monitor (optional). On computers with a video card, use the connector on the card.

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Technical Overview

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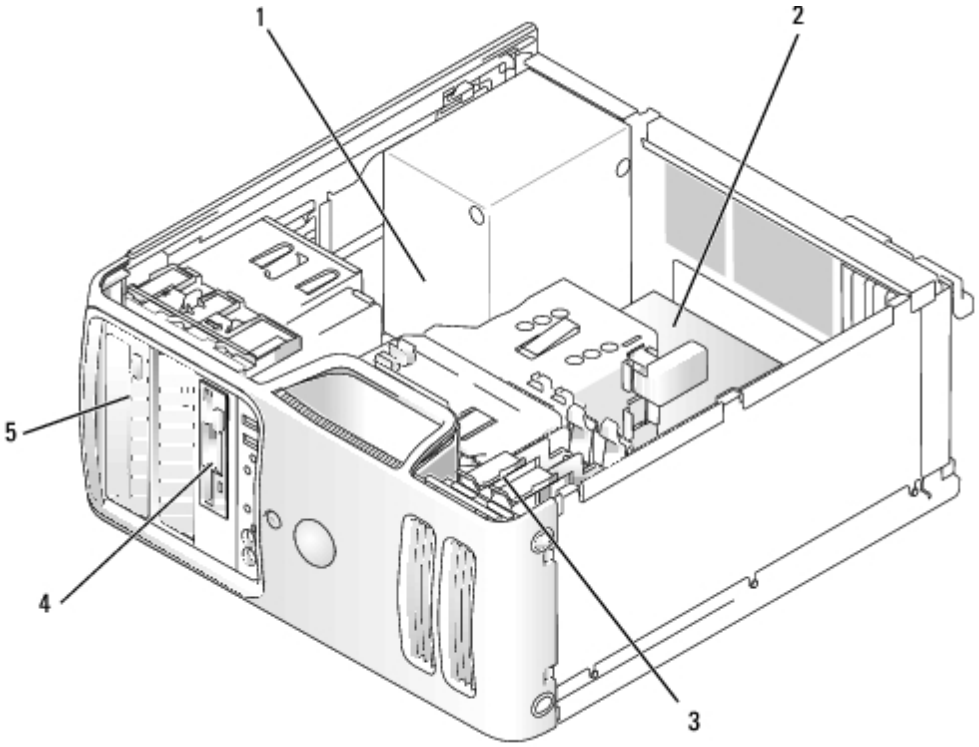
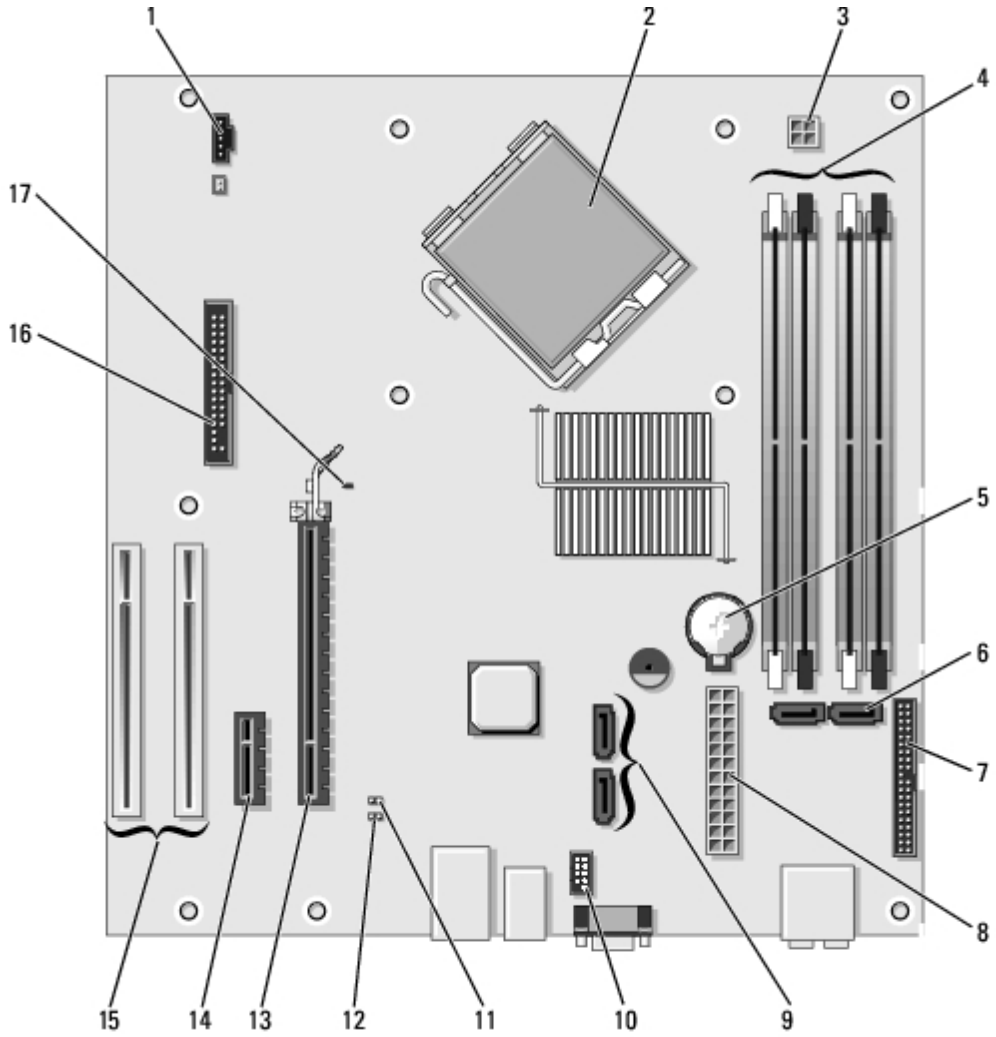
- Inside View of Your Computer
- System Board Components
- Power Supply DC Connector Pin Assignments

Inside View of Your Computer



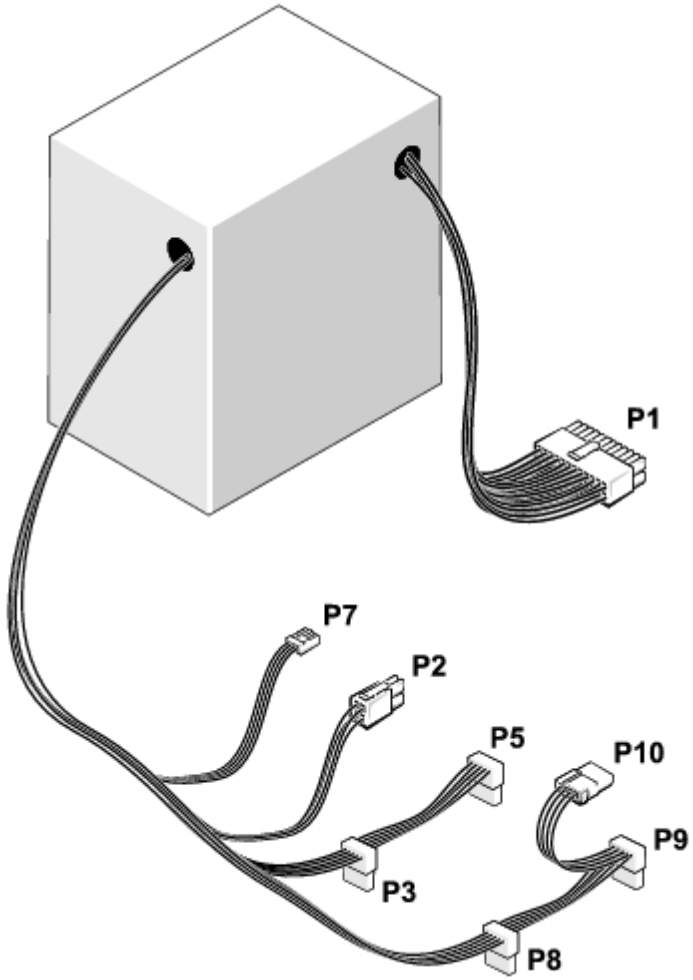
1	power supply	2	system board	3	hard drive
4	floppy drive (optional) or media card reader (optional)	5	CD or DVD drive		

System Board Components

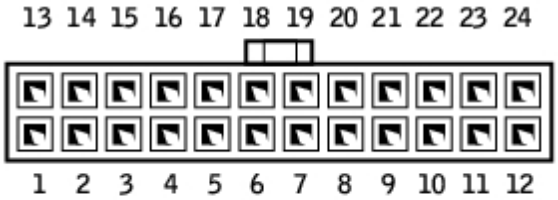


1	CPU fan connector	2	processor and heat sink connector	3	processor power connector
4	memory module connectors	5	battery socket (BATTERY)	6	SATA Connectors SATA0 and SATA1
7	front panel I/O connector	8	main power connector	9	SATA connectors SATA4 and SATA5
10	FlexBay USB connector	11	clear CMOS jumper (CLRCMOS)	12	password jumper (CLRPSWD)
13	PCI Express x16 card connector	14	PCI Express x1 card connector	15	PCI card connector
16	floppy drive connector (FLOPPY)	17	Standby LED (near blue lever on PCI Express x16 connector)		

Power Supply DC Connector Pin Assignments



DC Power Connector P1



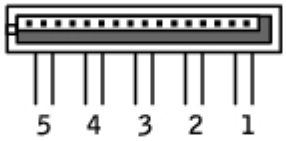
Pin Number	Signal Name	Color	Wire Gauge
1	+3.3 VDC	Orange	18-AWG
2	+3.3 VDC	Orange	18-AWG
3	COM	Black	18-AWG
4	+5 VDC	Red	18-AWG
5	COM	Black	18-AWG
6	+5 VDC	Red	18-AWG
7	COM	Black	18-AWG
8	POK	Gray	18-AWG
9	+5 VFP	Purple	18-AWG

10	+12 VB DC	White	18-AWG
11	+12VB DC	White	18-AWG
12	+3.3 VDC	Orange	18-AWG
13	+3.3 VDC	Orange	18-AWG
14	-12 VDC	Blue	18-AWG
15	COM	Black	18-AWG
16	PS-ON	Green	18-AWG
17	COM	Black	18-AWG
18	COM	Black	18-AWG
19	COM	Black	18-AWG
20	N/C	N/C	18-AWG
21	+5 VDC	Red	18-AWG
22	+5 VDC	Red	18-AWG
23	+5 VDC	Red	18-AWG
24	COM	Black	18-AWG

DC Power Connector P2

Pin Number	Signal Name	18-AWG Wire
1	COM	Black
2	COM	Black
3	+12 VA DC	Yellow
4	+12 VA DC	Yellow

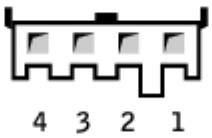
DC Power Connect P3, P5, P8, and P9



Pin Number	Signal Name	18-AWG Wire
1	+3.3 VDC	Orange
2	COM	Black
3	+5 VDC	Red

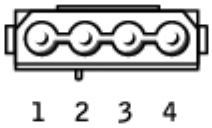
4	COM	Black
5	+12 VB DC	White

DC Power Connector P7



Pin Number	Signal Name	18-AWG Wire
1	+5 VDC	Red
2	COM	Black
3	COM	Black
4	+12 A VDC	Yellow

DC Power Connector P10



Pin Number	Signal Name	18-AWG Wire
1	+12 VA DC	Yellow
2	COM	Black
3	COM	Black
4	+5V DC	Red

NOTE: The P10 connector is intended for use with PCI Express graphics cards that have power requirements exceeding 75 watts.

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Specifications

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Processor	
Processor type	Intel® Pentium® 4 Intel® Pentium® D Intel® Core™ 2 Duo **NOTE:** Not all Pentium 4 processors support Hyper-Threading technology.
Level 1 (L1) cache	32 KB
Level 2 (L2) cache	1 MB for Pentium 4 5XX processors (with Hyper Threading) 2 MB for Pentium 4 6XX processors (with Hyper Threading) 2 x 2 MB for Pentium D 9XX processors (with dual core) 2 x 1 MB for Pentium D 8XX processors (with dual core) 256K for Celeron® D 3XX processors 2 MB for Intel Core™ E6400 processors and earlier 4 MB for Intel Core™ E6600 processors and later

Memory	
Type	533-MHz, 667-MHz, and 800-MHz dual DDR2 unbuffered SDRAM
Memory connectors	four
Memory capacities	256 MB, 512 MB, or 1 GB non-ECC
Maximum memory	4 GB **NOTE:** See Addressing Memory With 4-GB Configurations to verify the amount of memory available to the operating system.
BIOS address	F0000h

Computer Information	
Chipset	Intel G965 Express Chipset
RAID Support	RAID 1 (Mirroring)
DMA channels	eight
Interrupt levels	24

BIOS chip (NVRAM)	4 MB
NIC	integrated network interface capable of 10/100 communication
System clock	533-MHz, 800-MHz, or 1066-MHz data rate

Video	
Type	integrated Intel® Graphics Media Accelerator X3000 (Intel® GMA X3000) PCI Express

Audio	
Type	Sigmatel 9227

Expansion Bus	
Bus type	PCI 2.3 PCI Express x1 and x16
Bus speed	PCI: 33 MHz PCI Express: x1 slot bidirectional speed - 500 MB/s x16 slot bidirectional speed - 8 GB/s
PCI	
connectors	two
connector size	120 pins
connector data width (maximum)	32 bits
PCI Express	
connector	one x1
connector size	36 pins
connector data width (maximum)	1 PCI Express lane
PCI Express	
connector	one x16
connector size	164 pins
connector data width (maximum)	16 PCI Express lanes

Drives	
Externally accessible:	
Bays	two 5.25-inch drive bays one 3.5-inch drive bay (FlexBay)
Available devices	Serial ATA drives (4), floppy drive, USB memory devices, CD/DVD drive, and Media Card Reader

Internally accessible:	two bays for 1-inch high serial ATA hard drives

Connectors	
External connectors:	
Video	15-hole connector
Network adapter	RJ-45 connector
USB	two front-panel and six back-panel USB 2.0-compliant connectors
Audio	six connectors for 7.1 support
System board connectors:	
Serial ATA (SATA)	four 7-pin connectors
FlexBay Drive	one USB 10-pin header (with one pin removed for keying) for optional Media Card Reader (3.5-inch bay device)
Floppy drive	one 34-pin connector
Fan	one 5-pin connector
PCI 2.3	two 120-pin connectors
PCI Express x1	one 36-pin connector
PCI Express x16	one 164-pin connector

Controls and Lights	
Power button	push button
Power light	green light — Blinking green in sleep state; solid green for power-on state. amber light — Blinking amber indicates a problem with the power supply inside the computer. If the system cannot boot and there is a solid amber light, a problem with the system board may exist (see Power Lights).
Hard drive access light	green
Link integrity light (on integrated network adapter)	green light — A good connection exists between the network and the computer. off (no light) — The computer is not detecting a physical connection to the network.
Activity light (on integrated network adapter)	yellow blinking light
Diagnostic lights	four lights on the front panel (see Diagnostic Lights)
Standby power light	STBYLED on the system board

Power	
DC power supply:	
Wattage	305 W

Maximum heat dissipation	1040 BTU/hr
Voltage (see the safety instructions located in the *Product Information Guide* for important voltage setting information)	Manually selectable: 90 to 135 V and 180 to 265 V at 50/60 Hz
Backup battery	3-V CR2032 lithium coin cell

Physical	
Height	41.4 cm (16.3 inches)
Width	18.8 cm (7.4 inches)
Depth	45.7 cm (18.0 inches)
Weight	12.7 kg (28.0 lb)

Environmental	
Temperature:	
Operating	10° to 35°C (50° to 95°F)
Storage	–40° to 65°C (–40° to 149°F)
Relative humidity	20% to 80% (noncondensing)
Maximum vibration:	
Operating	5 to 350 Hz at 0.0002 G^2/Hz
Storage	5 to 500 Hz at 0.001 to 0.01 G^2/Hz
Maximum shock:	
Operating	40 G +/- 5% with pulse duration of 2 msec +/- 10% (equivalent to 20 in/sec [51 cm/sec])
Storage	105 G +/- 5% with pulse duration of 2 msec +/- 10% (equivalent to 50 in/sec [127 cm/sec])
Altitude:	
Operating	–15.2 to 3048 m (–50 to 10,000 ft)
Storage	–15.2 to 10,668 m (–50 to 35,000 ft)

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Advanced Troubleshooting

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- Power Lights
- Diagnostic Lights
- Beep Codes
- System Messages
- Dell Diagnostics
- Drivers
- Resolving Software and Hardware Incompatibilities

Power Lights

⚠ **CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.**

The power button light located on the front of the computer illuminates and blinks or remains solid to indicate different states:

- If the power light is green and the computer is not responding:
  - Ensure the display is connected and powered on.
  - If the display is connected and powered on see Diagnostic Lights.
- If the power light is blinking green, the computer is in standby mode. Press a key on the keyboard, move the mouse, or press the power button to resume normal operation.
- If the power light is off, the computer is either turned off or is not receiving power.
  - Reseat the power cable in the power connector on the back of the computer and the electrical outlet.
  - If the computer is plugged into a power strip, ensure that the power strip is plugged into an electrical outlet and that the power strip is turned on. Also, bypass power protection devices, power strips, and power extension cables to verify that the computer turns on properly.
  - Ensure that the electrical outlet is working by testing it with another device, such as a lamp.
  - Ensure that the main power cable and front panel cable are securely connected to the system board (see System Board Components).
- If the power light is blinking amber, the computer is receiving electrical power, but an internal power problem might exist.
  - Ensure that the voltage selection switch is set to match the AC power at your location (if applicable).
- If the power light is steady amber, a device might be malfunctioning or incorrectly installed.
  - Remove and then reinstall the memory modules (see Memory).
  - Remove and then reinstall any cards (see Cards).
  - Remove and then reinstall the graphics card, if applicable (see Cards).
  - Ensure that all power cables are securely connected to the system board (see System Board Components).

Diagnostic Lights

CAUTION: Before you perform any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

To help you troubleshoot a problem, your computer has four lights labeled 1, 2, 3, and 4 on the front panel (see Front View of the Computer). When the computer starts normally, the lights flash before turning off. If the computer malfunctions, the sequence of the lights helps to identify the problem.

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Light Pattern	**Problem Description**	**Suggested Resolution**
	The computer is in a normal "off" condition or a possible pre-BIOS failure has occurred. All four diagnostic lights display solid green and then turn off after the system successfully boots to the operating system.	• Plug the computer into a working electrical outlet (see Power Lights). • If the problem persists, contact Dell (see "Contacting Dell" in your *Owner's Manual*).
	A possible processor failure has occurred.	• Reseat the processor (see Processor). • If the problem persists, contact Dell (see "Contacting Dell" in your *Owner's Manual*).
	Memory modules are detected, but a memory failure has occurred.	• If two or more memory modules are installed, remove the modules (see Removing Memory), then reinstall one module (see Installing Memory) and restart the computer. If the computer starts normally, continue to install additional memory modules (one at a time) until you have identified a faulty module or reinstalled all modules without error. • If available, install properly working memory of the same type into your computer (see Installing Memory). • If the problem persists, contact Dell (see "Contacting Dell" in your *Owner's Manual*).
	A possible graphics card failure has occurred.	• Reseat any installed graphics cards (see Cards). • If available, install a working graphics card into your computer. • If the problem persists, contact Dell (see "Contacting Dell" in your *Owner's Manual*).
	A possible floppy drive or hard drive failure has occurred.	Reseat all power and data cables.
	A possible USB failure has occurred.	Reinstall all USB devices and check all cable connections.
	No memory modules are detected.	• If two or more memory modules are installed, remove the modules (see Removing Memory), then reinstall one module (see Installing Memory) and restart the computer. If the computer starts normally, continue to install additional memory modules (one at a time) until you have identified a faulty module or reinstalled all modules without error. • If available, install properly working memory of the same type into your computer (see Installing Memory). • If the problem persists, contact Dell (see "Contacting Dell" in your *Owner's Manual*).
	Memory modules are detected, but a memory configuration or	• Ensure that no special requirements for memory module/connector placement exist (see Memory). • Ensure that the memory you are using is supported by your computer

	compatibility error has occurred.	(see Memory). • If the problem persists, contact Dell (see "Contacting Dell" in your *Owner's Manual*).
	A possible expansion card failure has occurred.	1. Determine if a conflict exists by removing an expansion card (not a graphics card) and restarting the computer (see Cards). 2. If the problem persists, reinstall the card you removed, then remove a different card and restart the computer. 3. Repeat this process for each card installed. If the computer starts normally, troubleshoot the last card removed from the computer for resource conflicts (see Resolving Software and Hardware Incompatibilities). 4. If the problem persists, contact Dell (see "Contacting Dell" in your *Owner's Manual*).
	The system is operating in quick resume mode.	• Press the power button • Move the mouse • Press any key on the keyboard • Press any key on the optional MCE remote control
	Another failure has occurred.	• Ensure that all hard drive and CD/DVD drive cables are properly connected to the system board (see Drives). • If there is an error message on your screen identifying a problem with a device (such as the floppy drive or hard drive), check the device to make sure it is functioning properly. • If the operating system is attempting to boot from a device (such as the floppy drive or hard drive), check system setup (see System Setup) to make sure the boot sequence is correct for the devices installed on your computer. • If the problem persists, contact Dell (see "Contacting Dell" in your *Owner's Manual*).

Beep Codes

Your computer might emit a series of beeps during start-up if the monitor cannot display errors or problems. This series of beeps, called a beep code, identifies a problem. For example, beep code 1-3-1 (one possible beep code) consists of one beep, a burst of three beeps, and then one beep. This beep code tells you that the computer encountered a memory problem.

Reseating the memory modules (see Installing Memory) may correct the following beep code errors. If the problem persists, see "Contacting Dell" in your *Owner's Manual* for instructions on obtaining technical assistance.

Code	Cause
1-3-1 through 2-4-4	Memory not being properly identified or used
4-3-1	Memory failure above address 0FFFFh

If you experience any of the following non-memory related beep code errors, see "Contacting Dell" in your *Owner's Manual* for instructions on obtaining technical assistance.

Code	Cause
1-1-2	Microprocessor register failure
1-1-3	NVRAM
1-1-4	ROM BIOS checksum failure
1-2-1	Programmable interval timer
1-2-2	DMA initialization failure
1-2-3	DMA page register read/write failure

3-1-1	Slave DMA register failure
3-1-2	Master DMA register failure
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System Messages

NOTE: If the message you received is not listed in the table, see the documentation for either the operating system or the program that was running when the message appeared.

Message	Possible Cause	Corrective Action
8042 Gate-A20 error	The keyboard controller failed its test.	If you receive this message after you make changes in the system setup program, enter the system setup program (see Entering System Setup) and restore the original value(s).
Address Line Short!	An error in the address decoding circuitry in the memory has occurred.	Reseat the memory modules (see Memory).
C: Drive Error C: Drive Failure	The hard drive is not working or is not configured correctly.	Ensure that the drive is installed correctly in the computer and defined correctly in the system setup program (see Entering System Setup).
Cache Memory Bad, Do Not Enable Cache	The cache memory is not operating.	See "Contacting Dell" in your *Owner's Manual* for instructions on obtaining technical assistance.
CH-2 Timer Error	An error is occurring on the timer on the system board.	See "Contacting Dell" in your *Owner's Manual* for instructions on obtaining technical assistance.
CMOS Battery State Low	The system configuration	Enter the system setup program (see Entering

CMOS Checksum Failure CMOS System Options Not Set CMOS Display Type Mismatch CMOS Memory Size Mismatch CMOS Time and Date Not Set	information in the system setup program is incorrect or the battery charge may be low.	System Setup), verify the system configuration, and then restart the computer.
Diskette Boot Failure	Drive A or B is present but has failed the BIOS POST.	Ensure that the drive is installed correctly in the computer and defined correctly in the system setup program (see Entering System Setup). Check the interface cable at both ends.
DMA Error DMA 1 Error DMA 2 Error	Error in the DMA controller on the system board.	The keyboard or system board may need to be replaced.
FDD Controller Failure HDD Controller Failure	The BIOS cannot communicate with the floppy drive or hard drive controller.	Ensure that the floppy drive or the hard drive is installed correctly in the computer (see Drives) and defined correctly in the system setup program (see Entering System Setup). Check the interface cable at both ends.
INTR1 Error INTR2 Error	An interrupt channel on the system board failed to POST.	The keyboard or system board may need to be replaced.
Invalid Boot Diskette	The operating system cannot be located on drive A or drive C.	Enter the system setup program (see Entering System Setup)and confirm that drive A or drive C is properly identified.
Keyboard Error	The BIOS has detected a stuck key.	Ensure that nothing is resting on the keyboard; if a key appears to be stuck, carefully pry it up. If the problem persists, you may need to replace the keyboard.
KB/Interface Error	An error occurred with the keyboard connector.	Ensure that nothing is resting on the keyboard; if a key appears to be stuck, carefully pry it up. If the problem persists, you may need to replace the keyboard.
No ROM Basic	The operating system cannot be located on drive A or drive C.	Enter the system setup program (see Entering System Setup) and confirm that drive A or drive C is properly identified.

Dell Diagnostics

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

NOTE: The Dell Diagnostics only operate on Dell computers.

Starting the Dell Diagnostics

1. Turn on (or restart) your computer.

2. When the DELL logo appears, press <F12> immediately.

   NOTE: Keyboard failure may result when a key is held down for extended periods of time. To avoid possible keyboard failure, press and release <F12> in even intervals to open the **Boot Device Menu**.

   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop, then shut down your computer and try again.

3. At the **Boot Device Menu**, use the up- and down-arrow keys or press the appropriate number on the keyboard to highlight **Boot to Utility Partition**, and then press <Enter>.

   NOTE: The Quickboot feature changes the boot sequence for the current boot only. Upon restart, the computer boots according to the boot sequence specified in system setup.

4. At the Dell Diagnostics **Main Menu**, left-click with the mouse, or press <Tab> and then <Enter>, to select the test you want to run (see Dell Diagnostics Main Menu).

   NOTE: Write down any error codes and problem descriptions exactly as they appear and follow the instructions on the screen.

5. After all tests have completed, close the test window to return to the Dell Diagnostics **Main Menu**.

6. Close the **Main Menu** window to exit the Dell Diagnostics and restart the computer.

Dell Diagnostics Main Menu

The following tests can be run from the Dell Diagnostics **Main Menu**:

Option	Function
Express Test	Performs a quick test of system devices. The test typically takes 10 to 20 minutes and requires no interaction on your part. Run **Express Test** first to increase the possibility of tracing the problem quickly.
Extended Test	Performs a thorough check of system devices. The test typically takes an hour or more and peridocially requires your input to answer specific questions.
Custom Test	Tests a specific device in the system and can be used to customize the tests you want to run.
Symptom Tree	Lists a number of common symptoms and allows you to select a test based on the symptom of the problem you are having.

For any problem encountered during a test, a message appears with an error code and a description of the problem. Write down the error code and problem description exactly as it appears and follow the instructions on the screen. If you cannot resolve the problem, see "Contacting Dell" in your *Owner's Manual* for instructions on obtaining technical assistance.

NOTE: The Service Tag for your computer is located at the top of each test screen. When contacting Dell support, have your Service Tag ready.

The following tabs provide additional information for tests run from the **Custom Test** or **Symptom Tree** option:

Tab	Function
Results	Displays the results of the test and any error conditions encountered.
Errors	Displays error conditions encountered, error codes, and the problem description.
Help	Describes the test and any requirements for running the test.
Configuration	Displays the hardware configuration for the selected device.

(Custom Test only)	The Dell Diagnostics obtains configuration information for all devices from system setup, memory, and various internal tests, and it displays the information in the device list in the left pane of the screen. **NOTE:** The device list may not display the names of all the components installed on your computer or all devices attached to your computer.
Parameters (Custom Test only)	Allows you to customize the test, if applicable, by changing the test settings.

Drivers

What Is a Driver?

A driver is a program that controls a device such as a printer, mouse, or keyboard. All devices require a driver program.

A driver acts as a translator between the device and any other programs that use the device. Each device has its own set of specialized commands that only the driver for that device recognizes.

Required drivers are already installed on your computer—no further installation or configuration is needed.

Many drivers, such as the keyboard driver, come with your Microsoft® Windows® operating system. You may need to install drivers if you:

- Upgrade your operating system.
- Reinstall your operating system.
- Connect or install a new device.

Identifying Drivers

If you experience a problem with any device, identify whether the driver is the source of your problem and, if necessary, update the driver.

Windows XP

1. Click the **Start** button, then click **Control Panel**.
2. Under **Pick a Category**, click **Performance and Maintenance**.
3. Click **System**.
4. In the **System Properties** window, click the **Hardware** tab.
5. Click **Device Manager**.
6. Scroll down the list of devices and check for an exclamation point (a circle with a [**!**]) next to the device name.

   If an exclamation point appears next to the device name, you may need to reinstall the driver or install a new driver.

Reinstalling Drivers

NOTICE: The Dell Support website at **support.dell.com** provides approved drivers for your Dell™ computer. If you install drivers obtained from other sources, your computer may not function properly.

Using Windows XP Device Driver Rollback

If a problem occurs on your computer after you install or update a driver, use Windows XP Device Driver Rollback to replace the driver with the previously installed version.

1. Click **Start**, then click **Control Panel**.
2. Under **Pick a Category**, click **Performance and Maintenance**.
3. Click **System**.
4. In the **System Properties** window, click the **Hardware** tab.
5. Click **Device Manager**.
6. Right-click the device for which the new driver was installed, then click **Properties**.
7. Click the **Driver** tab.
8. Click **Roll Back Driver**.

Manually Reinstalling Drivers

After copying driver files to your hard drive, you may be required to update the driver manually.

NOTE: Drivers can be manually updated for any hardware device installed in your computer.

1. Click **Start**, then click **Control Panel**.
2. Under **Pick a Category**, click **Performance and Maintenance**.
3. Click **System**.
4. In the **System Properties** window, click the **Hardware** tab.
5. Click **Device Manager**.
6. Double-click the type of device for which you are installing the driver.
7. Right-click the device for which the driver is being reinstalled, then click **Properties**.
8. Click the **Driver** tab.
9. Click **Update Driver**.
10. Click **Install from a list or specific location (Advanced)**, then click **Next**.
11. Click to check **Include this location in the search**, then click **Browse** and navigate to where the driver files are located on your hard drive.
12. When the name of the appropriate driver appears, click **Next**.
13. Click **Finish** and restart your computer.

Resolving Software and Hardware Incompatibilities

If a device is not detected during the operating system setup or is detected but incorrectly configured, you can use the Hardware Troubleshooter to resolve the incompatibility.

To resolve incompatibilities using the Hardware Troubleshooter:

1. Click **Start**, then click **Help and Support**.
2. Type `hardware troubleshooter` in the **Search** field, then click the arrow to start the search.
3. Click **Hardware Troubleshooter** in the **Search Results** list.
4. In the **Hardware Troubleshooter** list, click **I need to resolve a hardware conflict on my computer**, and then click **Next**.

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System Setup

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- Overview
- Entering System Setup
- System Setup Options
- Boot Sequence
- Clearing Forgotten Passwords
- Clearing CMOS Settings
- Flashing the BIOS

Overview

Use system setup as follows:

- To change the system configuration information after you add, change, or remove any hardware in your computer
- To set or change a user-selectable option, such as the user password
- To read the current amount of memory or set the type of hard drive installed

Before you use system setup, it is recommended that you write down the system setup screen information for future reference.

NOTICE: Do not change the settings in system setup unless you are an expert computer user. Certain changes can cause your computer to work incorrectly.

Entering System Setup

1. Turn on (or restart) your computer.
2. When the DELL logo appears, press <F2> immediately.

NOTE: Keyboard failure may result when a key on the keyboard is held down for extended periods of time. To avoid possible keyboard failure, press and release <F2> in even intervals until the system setup screen appears.

If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop, then shut down your computer and try again.

System Setup Screens

The system setup screen displays current or changeable configuration information for your computer. Information on the screen is divided into three areas: the options list, active options field, and key functions.

	Option Field — This field contains information about each option. In this field you can view and make changes to your current settings. Use the right- and left-arrow keys

Options List — This field appears on the left side of the system setup window. The field is a scrollable list containing features that define the configuration of your computer, including installed hardware, power conservation, and security features. Scroll up and down the list with the up- and down-arrow keys. As an option is highlighted, the **Option Field** displays more information about that option and the option's current and available settings. By pressing <Enter> or the right- and left-arrow keys, you can toggle between a primary topic (collapsed) and subtopics (expanded).	to highlight an option. Press <Enter> to make that selection active.
	Key Functions — This field appears below the **Option Field** and lists keys and their functions within the active system setup field.

System Setup Options

NOTE: Depending on your computer and installed devices, the items listed in this section may not appear, or may not appear exactly as listed.

System	
System Info	Lists system information such as the computer name, the BIOS version number and date, system tags, and other system-specific information. **NOTE:** The system name listed in the BIOS may not appear exactly as the name that appears on the computer or in the computer's documentation.
CPU Info	Lists the processor type, processor bus speed, processor ID, clock speed, L2 cache, and additional features supported by your processor.
Memory Info	Indicates the type and amount of installed memory, memory speed and channel mode (dual or single).
Date/Time	Displays current date and time settings.
Boot Sequence	The computer attempts to boot from the sequence of devices specified in this list. **NOTE:** If you insert a boot device and restart the computer, the device appears in the system setup menu. To boot from a USB memory device, select the USB device and move it (by pressing <U>) so that it becomes the first device in the list.

Drives	
Diskette Drive	Identifies and defines the floppy drive attached to the FLOPPY connector on the system board. The options restrict identification of drives to **USB only**, **Internal only**, or **none (Off)**. The **Read Only** option restricts the ability to boot from any floppy device.
SATA 0 through 5	Identifies the drives attached to the SATA connectors on the system board, and lists the capacity for hard drives. **NOTE:** SATA2 and SATA3 positions are not supported in this system.

SATA Operation	Identifies and defines the SATA controller settings for RAID. You can set the SATA controller to **RAID Autodetect/ATA** or **RAID On**.

Onboard Devices	
Integrated NIC	You can set the NIC to **On** (default), **Off**, or **On w/PXE**. When the **On w/PXE** setting is active (available only for the future boot process), the computer prompts you to press <Ctrl><Alt><b>. Pressing this key combination causes a menu to display that allows you to select a method for booting from a network server. If a boot routine is not available from the network server, the computer attempts to boot from the next device in the boot sequence list.
Integrated Audio	Enables or disables the onboard audio controller.
USB Controller	Set to **On** (default) so that USB devices will be detected and supported in the operating system.
USB for FlexBay	This field enables and disables the internal USB for FlexBay. • **Off** — Internal USB for FlexBay is disabled. • **On** — Internal USB for FlexBay is enabled. • **No Boo**t (default) — Internal USB for FlexBay is enabled but not bootable. **NOTE:** This USB option appears only if a FlexBay device is installed.
Rear Quad USB	Enables or disables the four-stacked USB ports on the back of the computer.
Rear Dual USB	Enables or disables the two-stacked USB ports on the back of the computer.
Front USB	Enables or disables the two USB ports on the front of the computer.

Video	
Primary Video	This setting specifies which video controller is primary when two video controllers are present on the computer.

Performance	
Multiple CPU Core	If your computer processor supports more than one core, this option appears in the Options List.
Virtualization	If your computer processor supports virtual technology, this option appears in the Options List.
SpeedStep	If your computer processor supports Intel® SpeedStep® technology, then this option is listed and it allows you to enable or disable support for this feature.
HyperThreading	If your computer processor supports Hyper-Threading, this option appears in the Options List.
HDD Acoustic Mode	• **Bypass** (default) — Your computer does not test or change the current acoustics mode setting. • **Quiet** — The hard drive operates at its most quiet setting. • **Suggested** — The hard drive operates at the level suggested by the drive manufacturer. • **Performance** — The hard drive operates at its maximum speed. **NOTE:** Switching to performance mode will cause the drive heads to move faster, causing the hard drive to be noisier. However, some drives may not see an increase in data transfer rates. **NOTE:** Changing the acoustics setting does not alter your hard drive image.

Security	
Admin Password	This option provides restricted access to the computer's system setup program in the same way that access to the system can be restricted with the **System Password** option.
System Password	Displays the current status of the system's password security feature and allows a new system password to be assigned and verified.
Password Status	This option locks the system password field with the setup password. When the field is locked, you can no longer disable password security by pressing <Ctrl><Enter> when the computer starts.
Execute Disable	Specifies whether Execute Disable Memory Protection Technology will be on or off.

Power Management	
AC Recovery	Determines what happens when AC power is restored to the computer.
Auto Power On	Sets the computer to automatically turn on. Choices are **every day** or every **Monday through Friday**. The default setting is **Off**. This feature does not work if you turn off your computer using a power strip or surge protector.
Auto Power Time	Sets time to automatically turn on the computer. Time is kept in the standard 12-hour format (*hours:minutes*). Change the startup time by pressing the right- or left-arrow key to increase or decrease the numbers, or type numbers in both the date and time fields. This feature does not work if you turn off your computer using a power strip or surge protector.
Remote Wake Up	This option allows the computer to power up when a NIC or Remote Wakeup-capable modem receives a wake up signal. **On** is the default setting. **On w/Boot to NIC** allows the computer to attempt to boot from a network prior to using the boot sequence. **NOTE:** Normally, the system can be powered up remotely from suspend mode, hibernate mode, or when powered off.
Suspend Mode	The options are **S1**, a suspend state where the computer is running in a low-power mode, and **S3**, a standby state where the power is reduced or turned off for most components, but system memory remains active.
Quick Resume	This feature enables/disables the Intel® Viiv™ Quick Resume Technology. The default setting is **Off**.

Maintenance	
Service Tag	Displays the system service tag which is a unique, seven-digit alphanumeric system identifier.
SERR Message	Controls SERR message mechanism to support some add-in cards.
Load Defaults	Allows you to reset all options in the setup menu to the factory default.
Event Log	Displays the system event log.

POST Behavior	
Fastboot	When set to **On** (default), your computer starts more quickly by skipping certain configurations and tests.
Numlock Key	This option involves the rightmost bank of keys on your keyboard. When set to **On** (default), this option activates the numeric and mathematical features shown at the top of each key. When set to **Off**, this option activates the cursor-control functions labeled on the bottom of each key.
POST Hotkeys	This option allows you to specify the function keys to display on the screen when the computer starts.
Keyboard Errors	This option disables or enables keyboard error reporting when the computer starts.

Boot Sequence

This feature allows you to set the order in which the BIOS will search devices when trying to find an operating system.

NOTICE: If you modify any boot sequence settings, save the new settings to avoid losing the changes.

Option Settings

NOTE: The computer attempts to boot from all bootable devices, but if no bootable device is found, the computer generates an error message that states No boot device available. Press the <F1> key to retry the boot, or press the <F2> key to enter the setup utility.

- **Onboard or USB Floppy Drive —** The computer attempts to boot from the floppy drive. If there is no floppy in the drive or there is no floppy drive installed, the computer attempts to boot from the next bootable device in the sequence.

  NOTE: If there is a non-bootable floppy in the drive, the computer generates an error message. Follow the on-screen instructions to retry the boot.

- **Onboard SATA Hard Drive** — The computer attempts to boot from the primary hard drive. If no operating system is on the drive, the computer attempts to boot from the next bootable device.
- **Onboard or USB CD-ROM Drive** — The computer attempts to boot from the CD drive. If no CD is in the drive, or if the CD has no operating system, the computer attempts to boot from the next bootable device.
- **USB Device —** Insert the memory device into a USB port and restart the computer. When F12 = Boot Menu appears in the upper-right corner of the screen, press <F12>. The BIOS detects the device and adds the USB option to the boot menu.

  NOTE: To boot to a USB device, the device must be bootable. To ensure that your device is bootable, check the device documentation.

Changing Boot Sequence for the Current Boot

You can use this feature, for example, to restart your computer to a USB device, such as a floppy drive, memory key, CD-RW drive, or PXE (NIC).

NOTE: If you are booting to a USB floppy drive, you must first set the floppy drive to OFF in system setup (see System Setup Options).

1. If you are booting to a USB device, connect the USB device to a USB connector (see Front View of the Computer).
2. Turn on (or restart) your computer.
3. When the DELL logo appears, press <F12> immediately.

   NOTE: Keyboard failure may result when a key on the keyboard is held down for extended periods of time. To avoid possible keyboard failure, press and release <F12> in even intervals until the **Boot Device Menu** appears.

   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft Windows desktop, then shut down your computer and try again.
4. At the **Boot Device Menu**, use the up- and down-arrow keys or press the appropriate number on the keyboard to highlight the device that is to be used for the current boot only, and then press <Enter>.

   For example, if you are booting to a USB memory key, highlight **USB Flash Device** and press <Enter>.

NOTE: To boot to a USB device, the device must be bootable. To make sure your device is bootable, check the device documentation.

Changing Boot Sequence for Future Boots

1. Enter system setup (see Entering System Setup).
2. Use the arrow keys to highlight the **Boot Sequence** menu option, then press <Enter> to access the menu.

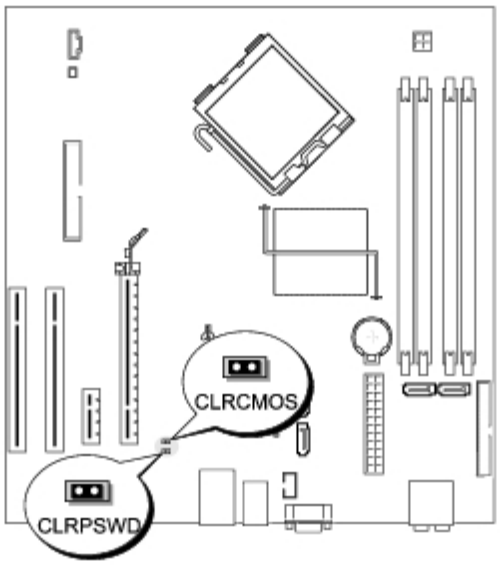
NOTE: Write down your current boot sequence in case you want to restore it.

3. Press the up- and down-arrow keys to move through the list of devices.
4. Press the spacebar to enable or disable a device. Enabled devices have a number assigned to them; disabled devices have no number assigned.
5. Press <U> or <D> to move a selected device up or down the list.

Clearing Forgotten Passwords

CAUTION: Before you perform any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

1. Follow the procedures in Before Working Inside Your Computer.
2. Remove the computer cover (see Removing the Computer Cover).



3. Locate the 2-pin password jumper (CLRPSWD) on the system board (see System Board Components), and remove the jumper to clear the password.

NOTE: When you receive your computer, the jumper plug is attached to pins 1 and 2.

4. Replace the computer cover (see Replacing the Computer Cover).
5. Connect your computer and monitor to electrical outlets, and then turn them on.
6. After the Microsoft® Windows® desktop appears on your computer, shut down the computer (see Turning Off Your Computer).
7. Turn off the monitor and disconnect it from the electrical outlet.
8. Disconnect the computer power cable from the electrical outlet, then press the power button to ground the system board.
9. Remove the computer cover (see Removing the Computer Cover).
10. Locate the 2-pin password jumper (CLRPSWD) on the system board (see System Board Components) and attach the jumper to pins 1 and 2 to re-enable the password feature.

11. Replace the computer cover (see Replacing the Computer Cover).

NOTICE: To connect a network cable, first plug the cable into the network device and then plug it into the computer.

12. Connect your computer and devices to electrical outlets, and then turn them on.

Clearing CMOS Settings

CAUTION: Before you perform any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

1. Follow the procedures in Before Working Inside Your Computer.
2. Remove the computer cover (see Removing the Computer Cover).
3. Reset the current CMOS settings:
    a. Locate the 2-pin CMOS jumper (CLRCMOS) on the system board (see System Board Components).

    NOTE: When you receive your computer, there is no jumper plug on the CMOS jumper.

    b. Remove the jumper plug from the password jumper (CLRPSWD) pins 1 and 2.
    c. Place the jumper plug on the CMOS jumper (CLRCMOS) pins 1 and 2 and wait approximately five seconds.
    d. Remove the jumper plug and replace it on the password jumper (CLRPSWD) pins 1 and 2.
4. Replace the computer cover (see Replacing the Computer Cover).

NOTICE: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

5. Connect your computer and devices to electrical outlets, and then turn them on.

Flashing the BIOS

The BIOS may require flashing when an update is available or when replacing the system board.

1. Turn on the computer.
2. Locate the BIOS update file for your computer at **support.dell.com**.
3. Click **Download Now** to download the file.
4. If the **Export Compliance Disclaimer** window appears, click **Yes, I Accept this Agreement**.

   The **File Download** window appears.
5. Click **Save this program to disk**, and then click **OK**.

   The **Save In** window appears.
6. Click the down arrow to view the **Save In** menu, select **Desktop**, and then click **Save**.

The file downloads to your desktop.

7. Click Close when the **Download Complete** window appears.

The file icon appears on your desktop and is titled the same as the download BIOS update file.

8. Double-click the file icon on the desktop and follow the on-screen instructions.

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Removing and Installing Parts

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- Drives
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- Floppy Drive
- Media Card Reader
- CD/DVD Drive
- Battery
- Power Supply
- Processor
- I/O Panel
- Processor Fan
- System Board
- Replacing the Computer Cover

This chapter provides procedures for removing and installing the components in your computer. Unless otherwise noted, each procedure assumes that the following conditions exist:

- You have performed the steps in Turning Off Your Computer and Before Working Inside Your Computer.
- You have read the safety information in your Dell™ *Product Information Guide.*
- A component can be installed by performing the removal procedure in reverse order.
- You have the tools listed in Recommended Tools.

Removing the Computer Cover

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

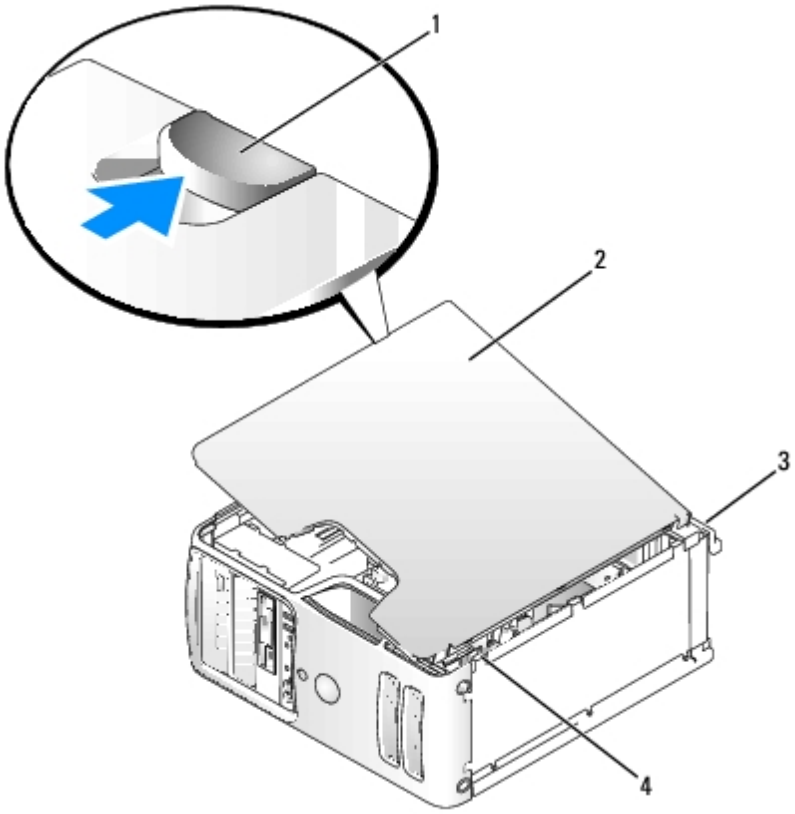
CAUTION: When working inside the computer, be aware that the heat sink assembly, power supply, and other components may be very hot during normal operation. Be sure that components have had sufficient time to cool before you touch them.

1. Follow the procedures in Before You Begin.

NOTICE: Ensure that sufficient space exists to support the removed cover—at least 30 cm (1 ft) of desk top space.

NOTICE: Ensure that you are working on a level, protected surface to avoid scratching either the computer or the surface on which it is resting.

2. Lay your computer on its side with the computer cover facing up.
3. Pull back the cover release latch located on the top panel.

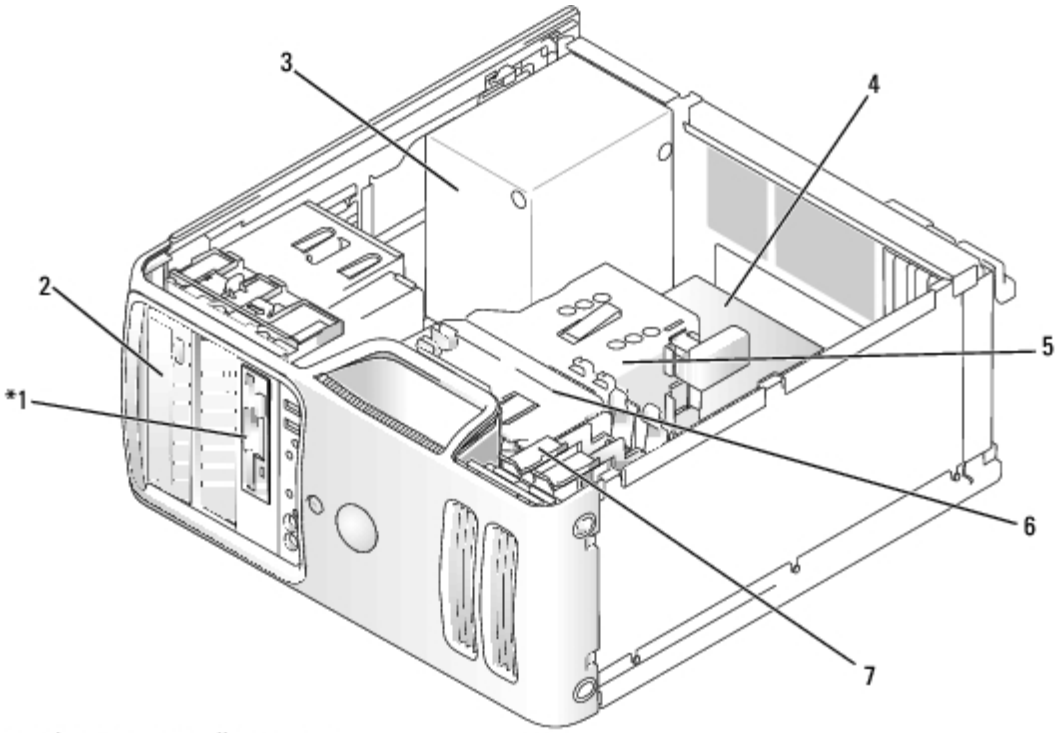


1	cover latch release	2	computer cover	3	back of computer
4	bottom hinges				

4. Locate the three hinge tabs on the bottom edge of the computer.
5. Grip the sides of the computer cover and pivot the cover up, using the bottom hinges as leverage points.
6. Release the cover from the hinge tabs and set it aside.

Inside View of Your Computer

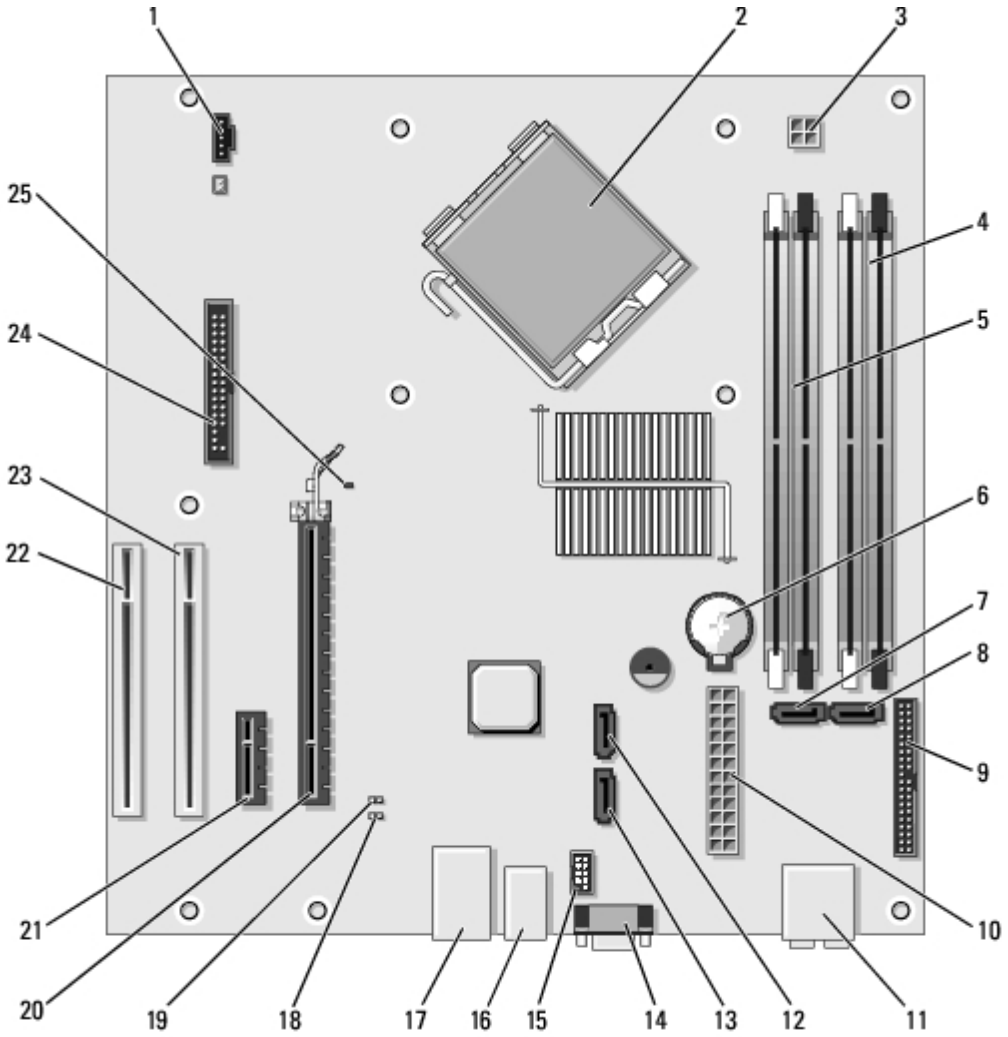
⚠ **CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.**



*May not be present on all computers.

1	floppy drive	2	CD or DVD drive	3	power supply
4	system board	5	processor shroud and heat sink	6	processor fan
7	hard drive				

System Board Components



1	processor fan connector (CPUFAN)	2	processor connector (CPU)	3	power connector (POWER12V)
4	memory module connectors (2,4)	5	memory module connectors (1,3)	6	battery socket (BATTERY)
7	SATA connector (SATA1)	8	SATA connector (SATA0)	9	front-panel connector (FRNTPANEL)
10	power connector (POWER)	11	line-in, line-out, microphone, side surround, center, and LFE connectors	12	SATA connector (SATA4)*
13	SATA connector (SATA5)*	14	video connector (VGA)	15	Media Card Reader connector
16	USB connectors (4) (USBBACK)	17	network connector (NIC) and USB connectors (2) (USB2)	18	password jumper (CLRPSWD)
19	clear CMOS jumper (CLRCMOS)	20	PCI Express x16 connector (SLOT1)	21	PCI Express x1 connector (SLOT2)
22	PCI connector (SLOT4)	23	PCI connector (SLOT3)	24	floppy drive connector (FLOPPY)
25	Standby LED (near blue lever on PCI Express x16 connector)				* There is no SATA2 or SATA3 connector on system board

Memory

You can increase your computer memory by installing memory modules on the system board.

Your computer supports DDR2 memory. For additional information on the type of memory supported by your computer, see Memory.

DDR2 Memory Overview

DDR2 memory modules should be installed in *pairs of matched memory size, speed, and technology*. If the DDR2 memory modules are not installed in matched pairs, the computer will continue to operate, but with a slight reduction in performance. See the label on the module to determine the module's capacity.

NOTE: Always install DDR2 memory modules in the order indicated on the system board.

The recommended memory configurations are:

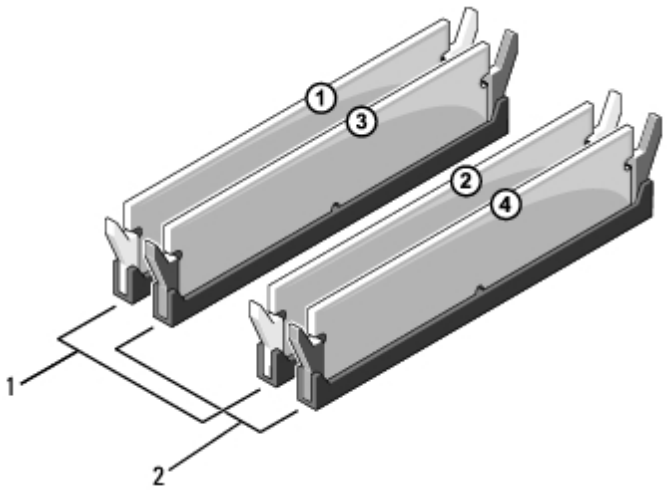
- A pair of matched memory modules installed in DIMM connectors 1 and 2

or

- A pair of matched memory modules installed in DIMM connectors 1 and 2 and another matched pair installed in DIMM connectors 3 and 4

NOTICE: Do not install ECC or buffered memory modules. Only unbuffered, non-ECC memory is supported.

- If you install mixed pairs of DDR2 533-MHz and DDR2 667-MHz memory, the modules function at the slowest speed installed.
- Be sure to install a single memory module in DIMM connector 1, the connector closest to the processor, before you install modules in the other connectors.



1	Channel A: matched pair of memory modules in connectors DIMM_1 and DIMM_2 (white securing clips)	2	Channel B: matched pair of memory modules in connectors DIMM_3 and DIMM_4 (black securing clips)

NOTICE: If you remove your original memory modules from the computer during a memory upgrade, keep them separate from any new modules that you may have, even if you purchased the new modules from Dell. If possible, do not pair an original memory module with a new memory module. Otherwise, your computer may not start properly. You should install your original memory modules in pairs either in DIMM connectors 1 and 2 or DIMM connectors 3 and 4.

NOTE: Memory purchased from Dell is covered under your computer warranty.

Addressing Memory With 4-GB Configurations

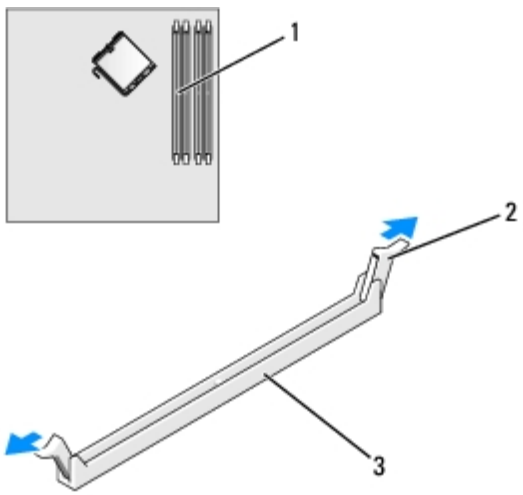
Your computer supports a maximum of 4 GB of memory when you use four 1-GB DIMMs. Current 32-bit operating systems, such as Microsoft® Windows® XP, can use a maximum of 4 GB of address space; however, the amount of memory available to the operating system is less than that installed. Certain components within the computer require address space in the 4-GB range. Any address space reserved for these components cannot be used by computer memory.

Installing Memory

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

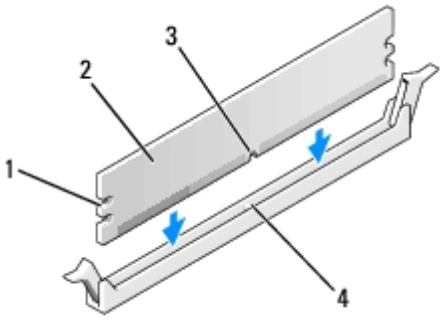
NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. Press out the securing clip at each end of the memory module connector.



1	memory connector closest to processor	2	securing clips (2)	3	connector

4. Align the notch on the bottom of the module with the crossbar in the connector.

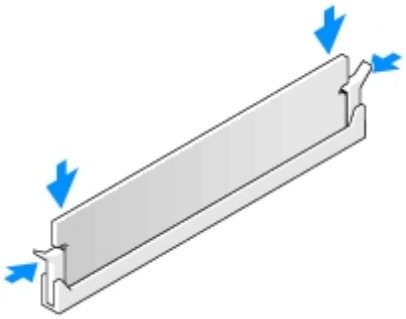


1	cutouts (2)	2	memory module	3	notch
4	crossbar				

NOTICE: To avoid damage to the memory module, press the module straight down into the connector while you apply equal force to each end of the module.

5. Insert the module into the connector until the module snaps into position.

   If you insert the module correctly, the securing clips snap into the cutouts at each end of the module.



6. Replace the computer cover (see Replacing the Computer Cover).

NOTICE: To connect a network cable, first plug the cable into the network device and then plug it into the computer.

7. Connect your computer and devices to electrical outlets and turn them on.
8. Right-click the **My Computer** icon and click **Properties**.
9. Click the **General** tab.
10. To verify that the memory is installed correctly, check the amount of memory (RAM) listed.

Removing Memory

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).

3. Press out the securing clip at each end of the memory module connector.
4. Grasp the module and pull up.

   If the module is difficult to remove, gently ease the module back and forth to remove it from the connector.

Cards

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Your Dell™ computer provides the following slots for PCI and PCI Express cards:

- Two PCI card slots
- One PCI Express x16 card slot
- One PCI Express x1 card slot

PCI Cards

Your computer supports two PCI cards.

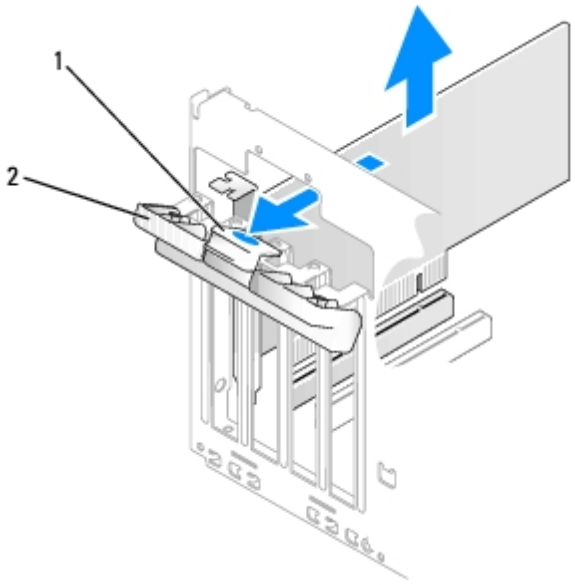
If you are installing or replacing a card, follow the procedures in the next section. If you are removing but not replacing a PCI card, see Removing a PCI Card.

If you are replacing a card, remove the current driver for the card from the operating system.

If you are installing or replacing a PCI Express card, see Installing a PCI Express Card.

Installing a PCI Card

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).



1	release tab	2	card retention door

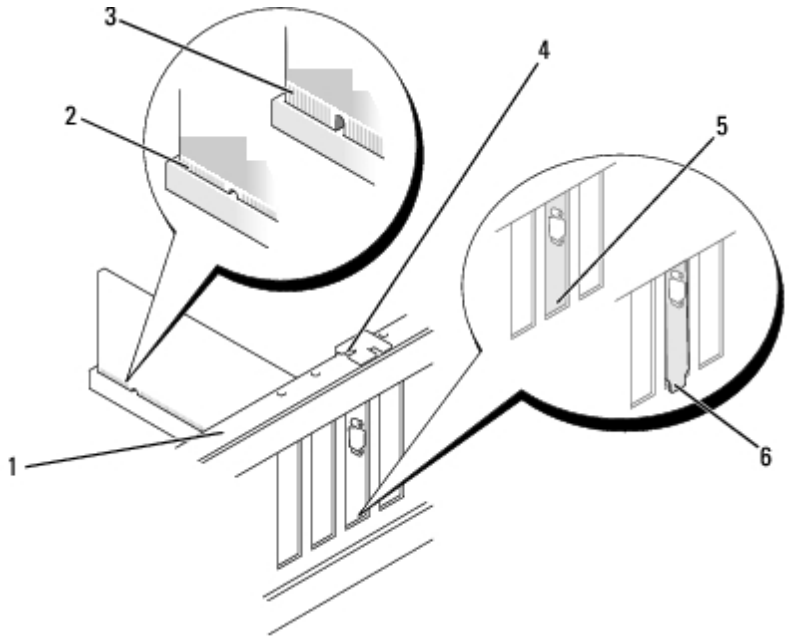
3. Gently push the release tab on the card retention door from the inside to pivot the door open. The door is hinged and will remain in the open position.
4. If you are installing a new card, remove the filler bracket to create a card-slot opening. Then continue with step 6.
5. If you are replacing a card that is already installed in the computer, remove the card.

   Disconnect any cables connected to the card. Grasp the card by its top corners, and ease it out of its connector.
6. Prepare the card for installation.

   See the documentation that came with the card for information on configuring the card, making internal connections, or otherwise customizing it for your computer.

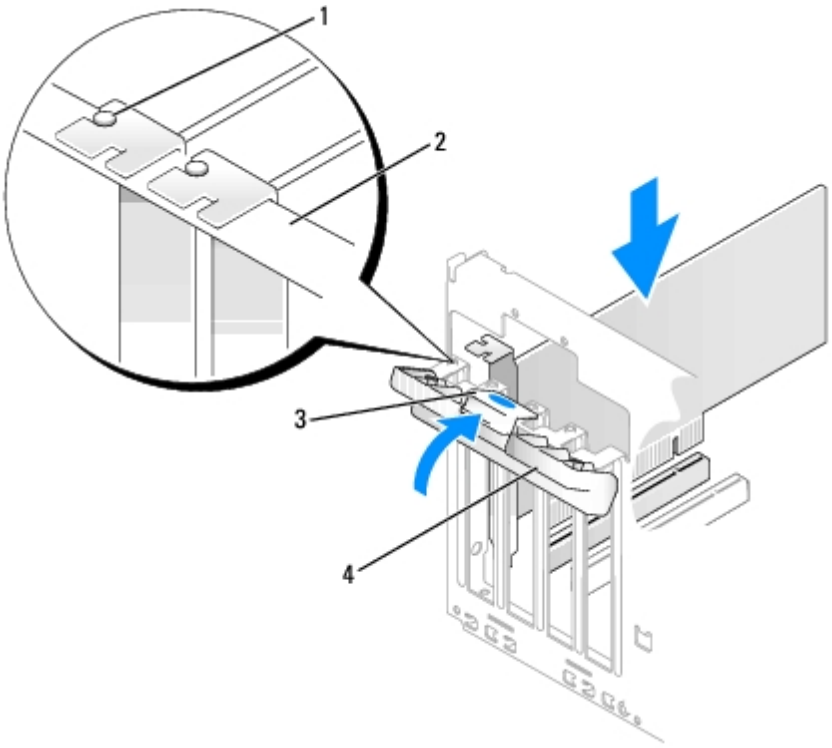
CAUTION: Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

7. Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.



1	alignment bar	2	fully seated card	3	not fully seated card
4	alignment guide	5	bracket within slot	6	bracket caught outside of slot

8. Before you close the card retention door, ensure that:
   - The tops of all cards and filler brackets are flush with the alignment bar.
   - The notch in the top of the card or filler bracket fits around the alignment guide.



1	alignment guide	2	alignment bar	3	release tab
4	card retention door				

9. Close the card retention door by snapping it into place to secure the cards.

NOTICE: Do not route card cables over or behind the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

10. On a new card, connect any cables that are part of the installation. See the documentation for the card for information about the card's cable connections. On a replacement card, connect any cables that you removed in step 5.

NOTICE: To connect a network cable, first plug the cable into the network device and then plug it into the computer.

11. Replace the computer cover (see Replacing the Computer Cover).

NOTICE: To connect a network cable, first plug the cable into the network device and then plug it into the computer.

12. Connect your computer and devices to electrical outlets and turn them on.
13. If you installed a sound card:
    a. Enter system setup (see System Setup), select **Audio Controller**, and then change the setting to **Off**.
    b. Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the microphone, speaker/headphone, or line-in connectors on the back panel.
14. If you installed an add-in network adapter and want to use only the add-in network adapter, then disable the integrated network adapter:
    a. Enter system setup (see System Setup), select **Integrated NIC,** and then change the setting to **Off**.
    b. Connect the network cable to the add-in network adapter's connectors. Do not connect the network cable to the integrated connector on the back panel.

NOTE: You can use the integrated NIC and add-in NIC adapter at the same time if you have a requirement. In this case, set the **Integrated NIC** setting to **On** and install the driver for the add-in adapter.

15. Install any drivers required for the card as described in the card documentation.

Removing a PCI Card

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. Gently push the release tab on the card retention door from the inside to pivot the door open. The door is hinged and will remain in the open position.
4. If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.

5. Close the card retention door by snapping it into place to secure the cards.

NOTICE: To connect a network cable, first plug the cable into the network device and then plug it into the computer.

6. Replace the computer cover (see Replacing the Computer Cover).
7. Reconnect the computer and devices to electrical outlets, and then turn them on.

8. Remove any drivers required for the card as described in the card documentation.
9. If you removed a sound card:
    a. Enter system setup (see System Setup), select **Audio Controller**, and then change the setting to **On**.
    b. Connect external audio devices to the audio connectors on the back panel of the computer.
10. If you removed an add-in network adapter:
    a. Enter system setup (see System Setup), select **Integrated NIC**, and then change the setting to **On**.
    b. Connect the network cable to the integrated connector on the back panel of the computer.

PCI Express Cards

Your computer supports one PCI Express x16 card and one PCI Express x1 card.

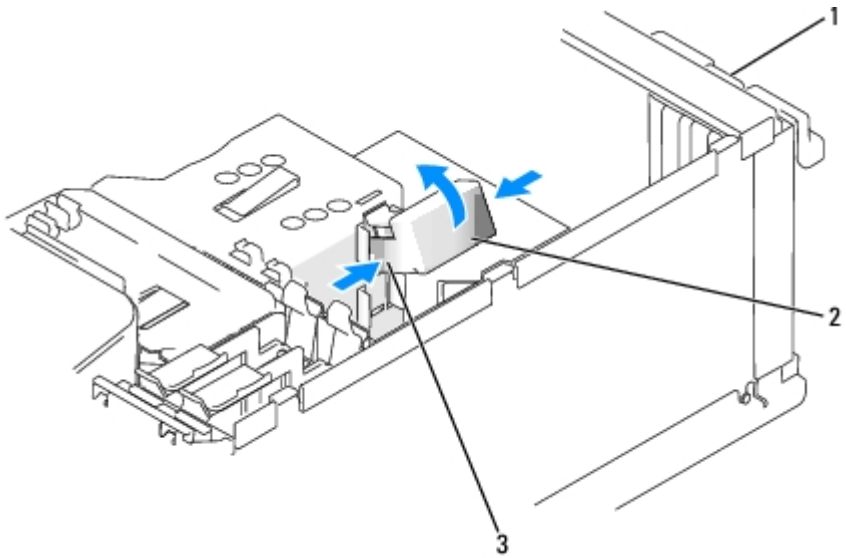
- If you are installing or replacing a PCI Express card, follow the procedures in the next section.
- If you are removing, but not replacing a card, see Removing a PCI Express Card.
- If you are installing or replacing a PCI card, see Installing a PCI Card.

CAUTION: When replacing the PCI Express Video Card, be aware that the heat sink on the card may be very hot during normal operation. Be sure that the heat sink has had sufficiant time to cool before you touch the card.

NOTE: If you are replacing a card, remove the current driver for the card from the operating system.

Installing a PCI Express Card

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).



1	card retention door	2	card retention mechanism	3	release tabs (2)

3. Gently push the release tab on the card retention door from the inside to pivot the door open. The door is hinged and will remain in the open position (see Installing a PCI Card for an illustration of the card retention door).

4. If your computer includes a card retention mechanism to secure the x16 card in place from the top:

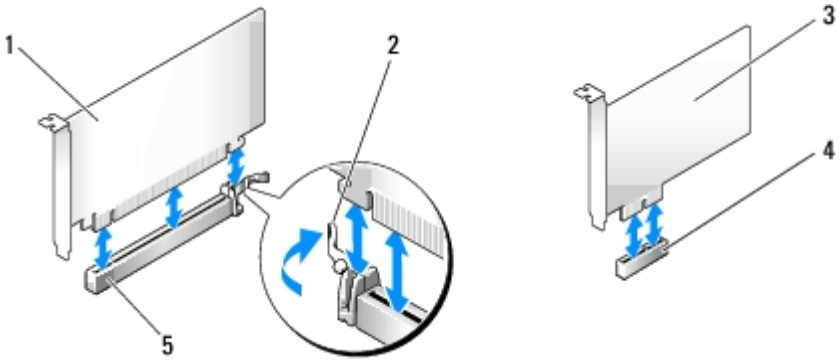
    a. Pivot the mechanism upward and gently squeeze in on the sides to release the mechanism from the two tab slots holding it in place.

    b. Set the retention mechanism aside.

5. If you are installing a new card, remove the filler bracket to create a card-slot opening, then continue with step 7.

6. If you are replacing a card that is already installed in the computer, remove the card.

    Disconnect any cables connected to the card. Gently pull the securing tab, grasp the card by its top corners, and then ease it out of its connector.



1	PCI Express x16 card	2	securing tab	3	PCI Express x1 card
4	PCI Express x1 card slot	5	PCI Express x16 card slot		

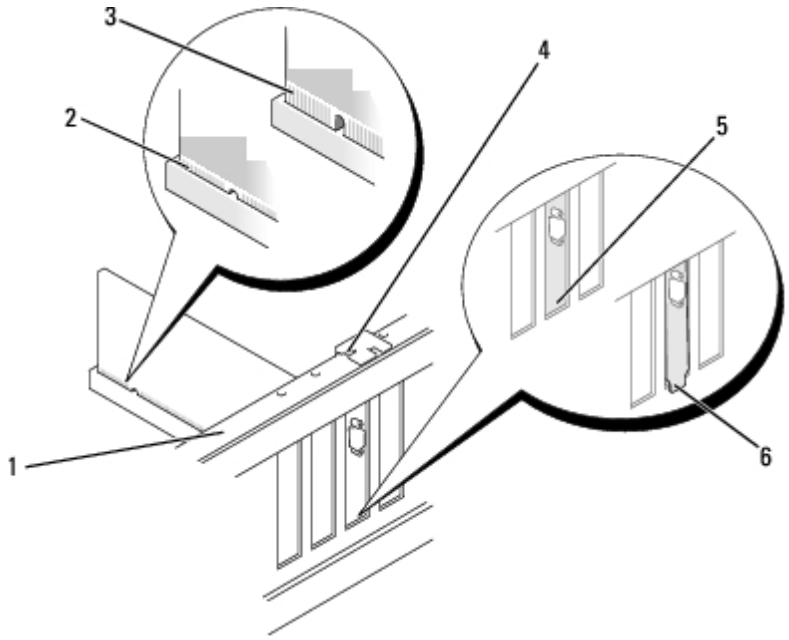
7. Prepare the card for installation.

    See the documentation that came with the card for information on configuring the card, making internal connections, or otherwise customizing it for your computer.

CAUTION: Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

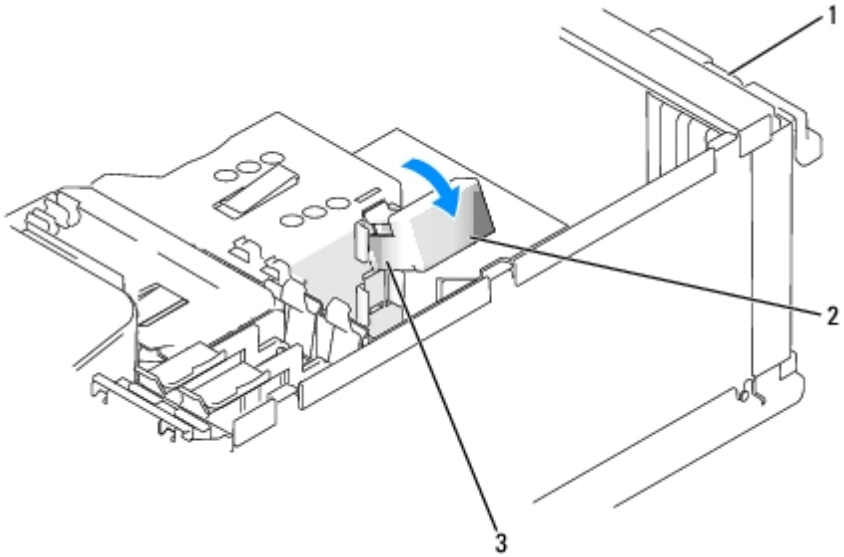
8. If you are installing the card into the PCI Express x16 card connector, position the card so the securing slot is aligned with the securing tab, and gently pull the securing tab.

9. Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.



1	alignment bar	2	fully seated card	3	not fully seated card
4	alignment guide	5	bracket within slot	6	bracket caught outside of slot

10. Ensure that:
    - The tops of all cards and filler brackets are flush with the alignment bar.
    - The notch in the top of the card or filler bracket fits around the alignment guide.
11. If previously removed, snap the card retention mechanism into place, securing the x16 PCI card.



1	card retention door	2	card retention mechanism	3	release tabs (2)

NOTICE: Do not route card cables over or behind the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

NOTICE: To connect a network cable, first plug the cable into the network device and then plug it into the computer.

12. Replace the computer cover (see Replacing the Computer Cover).

13. Reconnect the computer and devices to electrical outlets, and then turn them on.
14. If you installed a sound card:
    a. Enter system setup (see System Setup), select **Audio Controller**, and then change the setting to **Off**.
    b. Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the microphone, speaker/headphone, or line-in connectors on the back panel.
15. If you installed an add-in network adapter, and want to only use it, then disable the integrated network adapter:
    a. Enter system setup (see System Setup), select **Integrated NIC,** and then change the setting to **Off**.
    b. Connect the network cable to the add-in network adapter's connectors. Do not connect the network cable to the integrated connector on the back panel.

NOTE: You can use the integrated NIC and add-in NIC adapter at the same time. In this case, set the **Integrated NIC** setting to **On** and install the driver for the add-in adapter.

16. Install any drivers required for the card as described in the card documentation.

Removing a PCI Express Card

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. Gently push the release tab on the card retention door from the inside to pivot the door open. The door is hinged and will remain in the open position (see Installing a PCI Card for an illustration of the card retention door).
4. If your computer includes a card retention mechanism, to secure the x16 card in place from the top:
    a. Pivot the mechanism upward and gently squeeze in on the sides to release the mechanism from the two tab slots holding it in place.
    b. Set the retention mechanism aside.
5. If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.

6. Reseat the card retention mechanism in the tabs and pivot downward to snap it into place.
7. Close the card retention door to snap it into place, securing the cards.

NOTICE: To connect a network cable, first plug the cable into the network device and then plug it into the computer.

8. Replace the computer cover (see Replacing the Computer Cover).
9. Reconnect the computer and devices to electrical outlets, and then turn them on.
10. Remove any drivers required for the card as described in the card documentation.
11. If you removed a sound card:
    a. Enter system setup (see System Setup), select **Audio Controller**, and then change the setting to **On**.
    b. Connect external audio devices to the audio connectors on the back panel of the computer.
12. If you removed an add-in network adapter:

a. Enter system setup (see System Setup), select **Integrated NIC**, and then change the setting to **On**.

b. Connect the network cable to the integrated connector on the back panel of the computer.

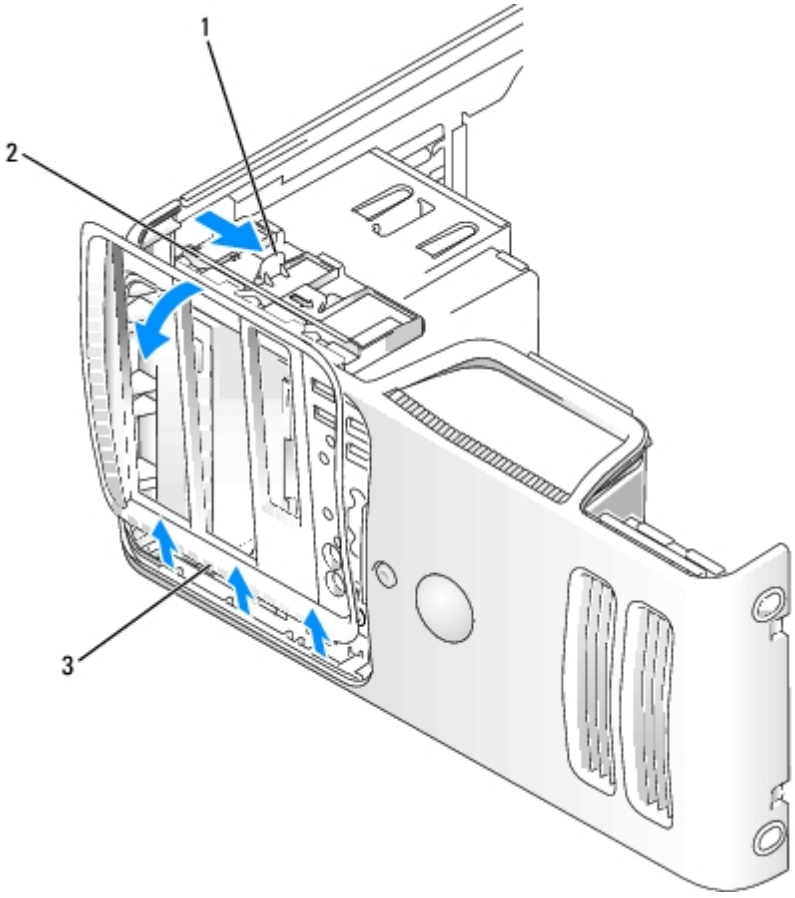
Drive Panel

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

Removing the Drive Panel

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).



1	sliding plate lever	2	sliding plate	3	drive panel

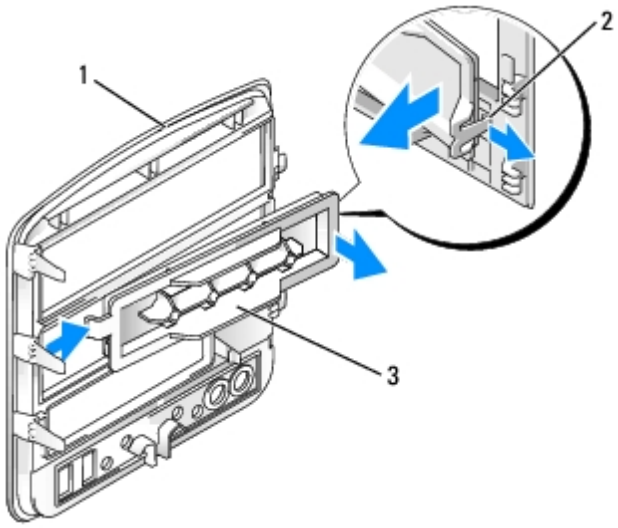
3. Grasping the lever on the sliding plate, pull the sliding plate to the right until it snaps into the open position.

NOTE: This sliding plate secures and releases the drive panel and helps to secure the drives.

4. By pushing from the inside and pivoting the drive panel to the left, you can release the drive panel from its side hinges.

5. Set the drive panel aside.

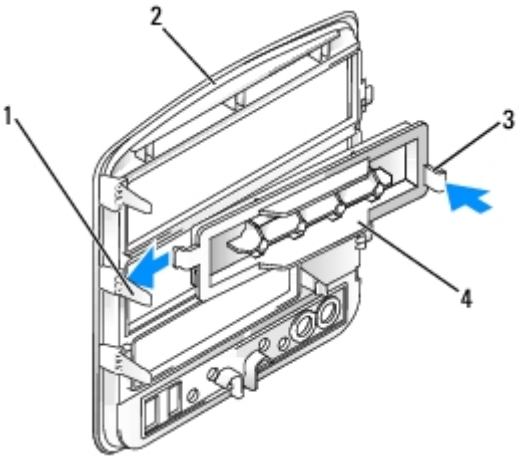
Removing the Drive-Panel Insert



1	drive panel	2	drive-panel insert tab	3	drive-panel insert

1. Press the drive-panel insert tab towards the center of the drive-panel insert to disengage the insert from the drive panel.
2. Without releasing the tab, pivot the drive-panel insert out and away from the drive panel.
3. Set the drive-panel insert aside.

Installing the Drive-Panel Insert

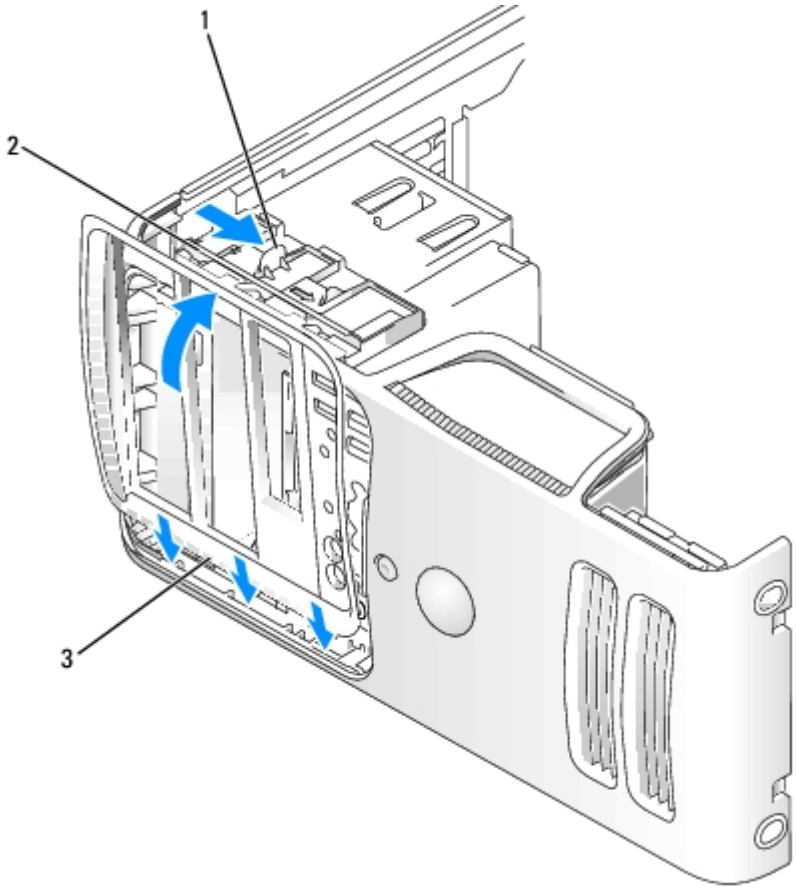


1	center drive-panel tab	2	drive panel	3	drive-panel insert tab
4	drive-panel insert				

1. Slide the tab on the left side of the drive-panel insert under the center drive-panel tab.
2. Rotate the drive-panel insert into place and snap the drive-panel insert tab over the corresponding tab on the drive panel.

Installing the Drive Panel

1. Follow the procedures in Before You Begin.



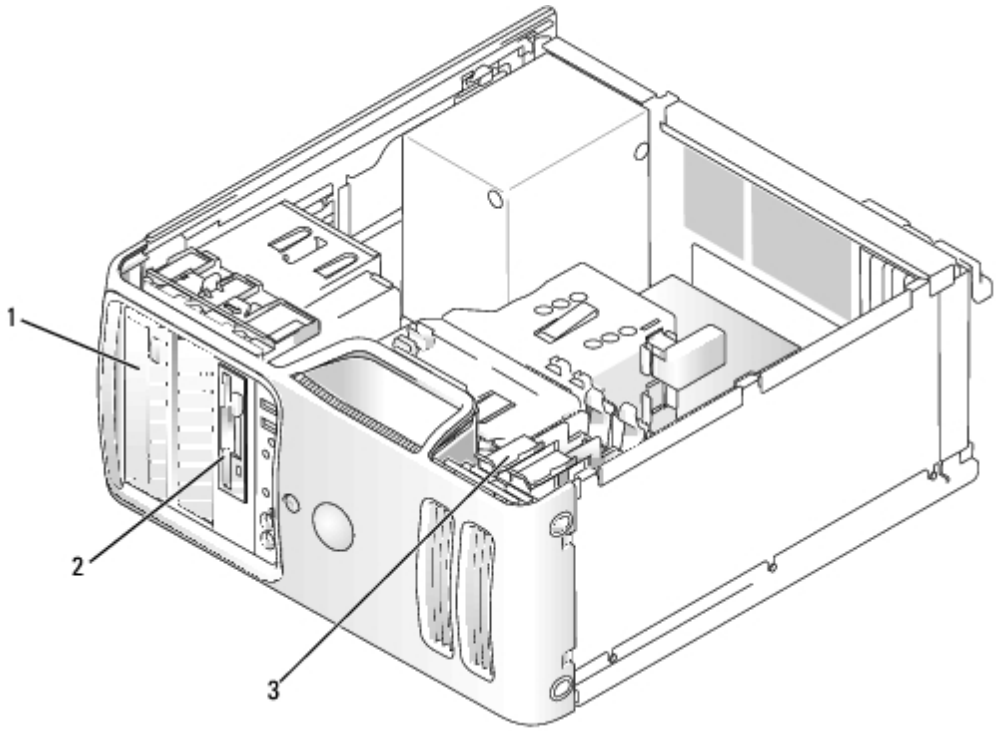
1	sliding plate lever	2	sliding plate	3	drive panel

2. Align the drive panel tabs with the side door hinges.
3. Rotate the drive panel toward the computer until it snaps into place on the front panel.

Drives

The computer supports a combination of these devices:

- Two serial ATA hard drives
- Two serial ATA CD or DVD drives
- An optional floppy drive or an optional Media Card Reader



1	CD/DVD drive	2	FlexBay for optional floppy drive or optional Media Card Reader	3	hard drive

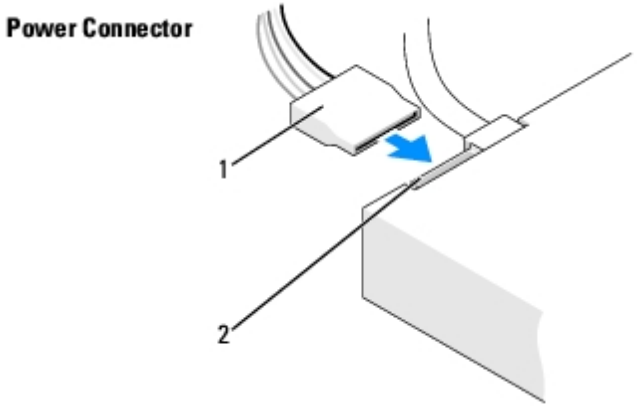
Connect serial ATA hard drives to connectors labeled "SATA0" or "SATA1" on the system board.

Connect serial ATA CD or DVD drives to connectors labeled "SATA4" or "SATA5" on the system board.

NOTE: Connectors SATA2 and SATA3 are not installed on the system board.

Connecting Drive Cables

When you install a drive, you connect a DC power cable and a data cable to the back of the drive.



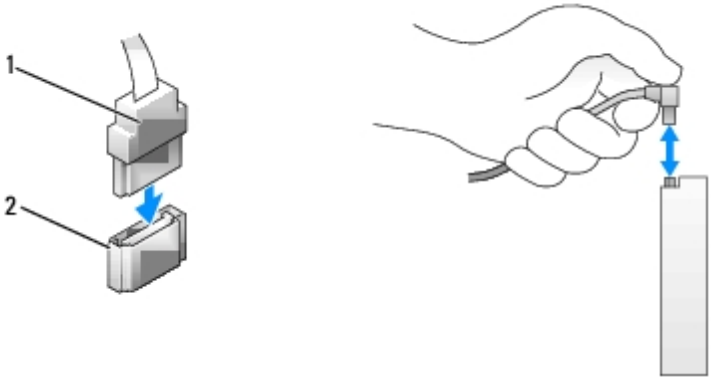
1	power cable	2	power input connector

Drive Interface Connectors

Most interface connectors are keyed for correct insertion; that is, a notch or a missing pin on one connector matches a tab or a filled-in hole on the other connector. Keyed connectors ensure that the pin-1 wire in the cable goes to the pin-1 end of the connector. The pin-1 end of a connector on a board or a card is usually indicated by a silk-screened "1" printed directly on

the board or card.

Serial ATA Connector



1	interface cable	2	interface connector

Hard Drive

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

NOTICE: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

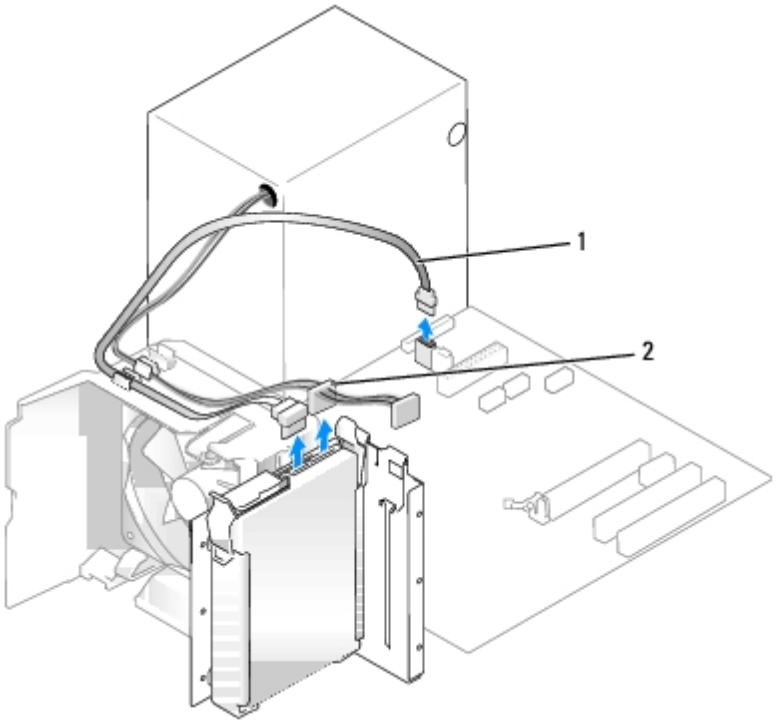
NOTICE: If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.

Check the documentation for the drive to verify that it is configured for your computer.

Removing a Hard Drive

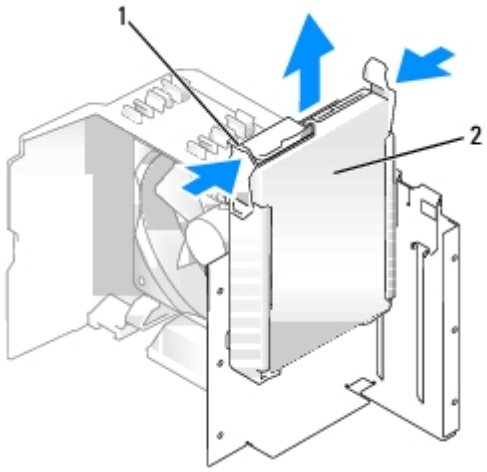
1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. Disconnect the power and data cables from the drive.

NOTICE: Use the pull-tab to remove the data cable from your hard drive or from the system board.



1	serial ATA data cable	2	power cable

4. Press in on the blue tabs on each side of the drive and slide the drive up and out of the computer.



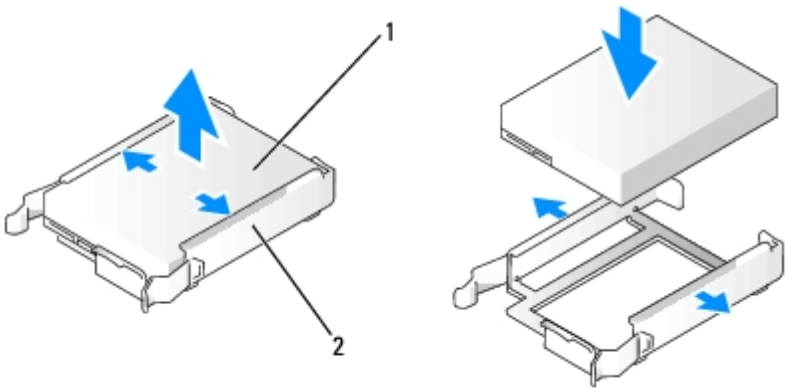
1	tabs (2)	2	hard drive

5. If removing this drive changes the drive configuration, then be sure to reflect these changes in system setup. When you restart your computer, enter system setup (see System Setup), then go to the "Drives" section of the BIOS and under SATA 0 through 5, set the SATA ports to the correct configuration.

Installing a Hard Drive

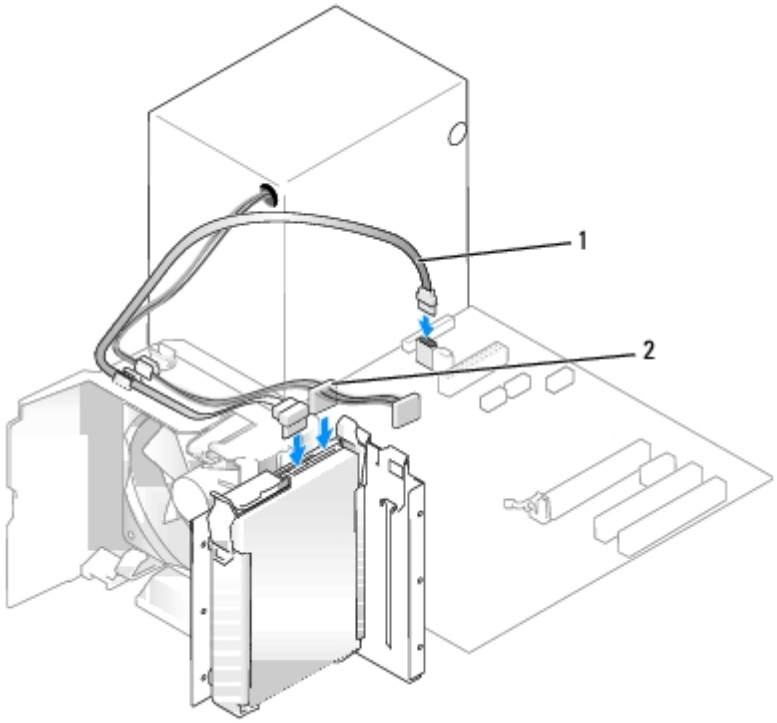
1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. Check the documentation for the drive to verify that it is configured for your computer.

NOTE: If your replacement hard drive does not have the hard drive bracket attached, remove the bracket from the old drive by unsnapping it from the drive. Snap the bracket onto the new drive.



1	drive	2	hard-drive bracket

4. Gently slide the drive into place until you feel a click or feel the drive securely installed.
5. Connect the power and hard-drive cables to the drive.



1	serial ATA data cable	2	power cable

6. Check all cables to be certain that they are properly connected and firmly seated.
7. Replace the computer cover (see Replacing the Computer Cover).

NOTICE: To connect a network cable, first plug the cable into the network port or device and then plug it into the computer.

8. Connect your computer and devices to electrical outlets, and then turn them on.
9. If installing this drive changes the drive configuration, be sure to reflect these changes in system setup. When you restart your computer, enter system setup (see System Setup), then go to the "Drives" section of the BIOS and under

SATA 0 through 5, set the SATA ports to the correct configuration.

See the documentation that came with the drive for instructions on installing any software required for drive operation.

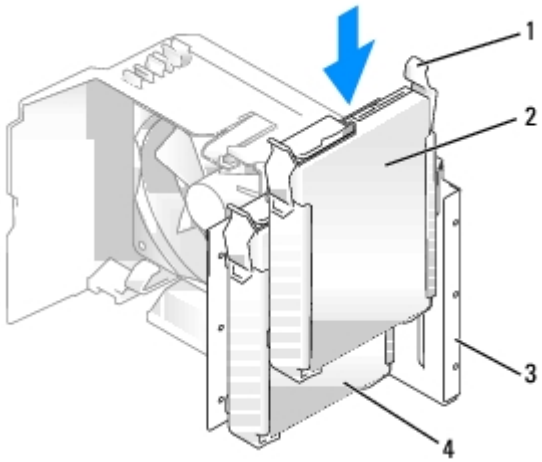
Adding a Second Hard Drive

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

NOTICE: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

1. Check the documentation for the drive to verify that it is configured for your computer.
2. Follow the procedures in Before You Begin.
3. Remove the computer cover (see Removing the Computer Cover).
4. Press in on the blue release tabs on each side of the hard drive bracket and slide it up and out of the computer.
5. Snap the bracket to the hard drive.
6. Gently slide the new drive (second hard drive) into place until you feel a click or feel the drive securely installed.



1	release tabs (2)	2	second hard drive in lower bay	3	hard drive bay
4	primary hard drive in upper bay				

7. Connect the power and data cables to the drive.
8. Connect the other end of the data cable to SATA1 on the system board (see System Board Components).
9. Check all cables to be certain that they are properly connected and firmly seated.
10. Replace the computer cover (see Replacing the Computer Cover).

NOTICE: To connect a network cable, first plug the cable into the network port or device and then plug it into the computer.

11. Connect your computer and devices to electrical outlets, and then turn them on.
12. When you restart your computer, enter system setup (see System Setup), then go to the "Drives" section of the BIOS

and under SATA 0 through 5, set the SATA port to "**ON**" for the hard drive you just installed to enable the drive.

See the documentation that came with the drive for instructions on installing any software required for drive operation.

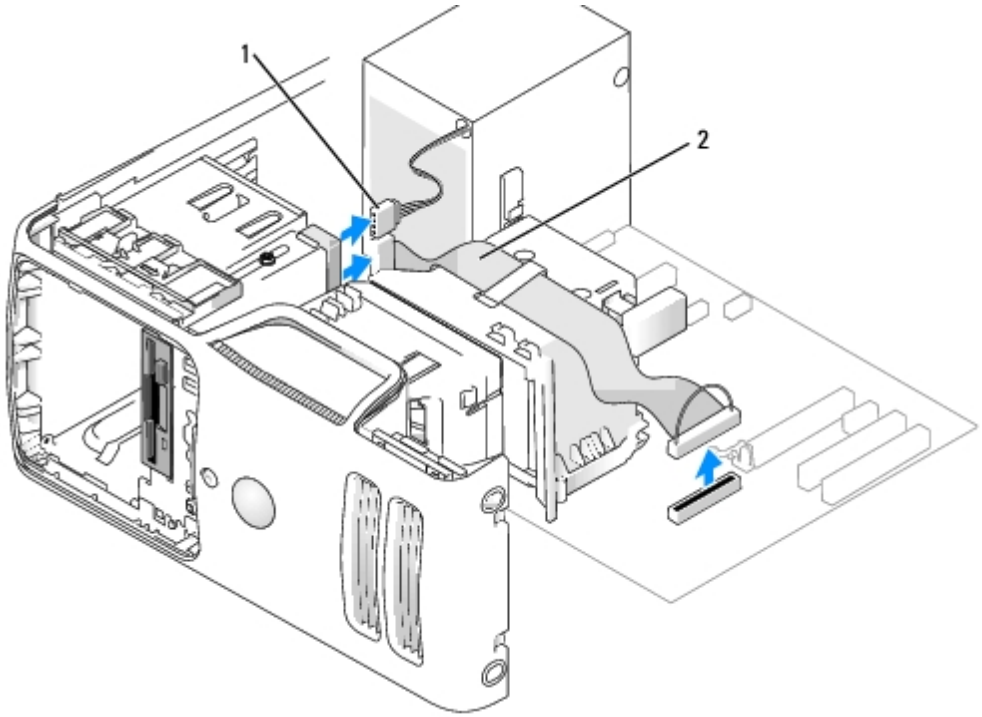
Floppy Drive

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

Removing a Floppy Drive

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. Remove the drive panel (see Removing the Drive Panel).

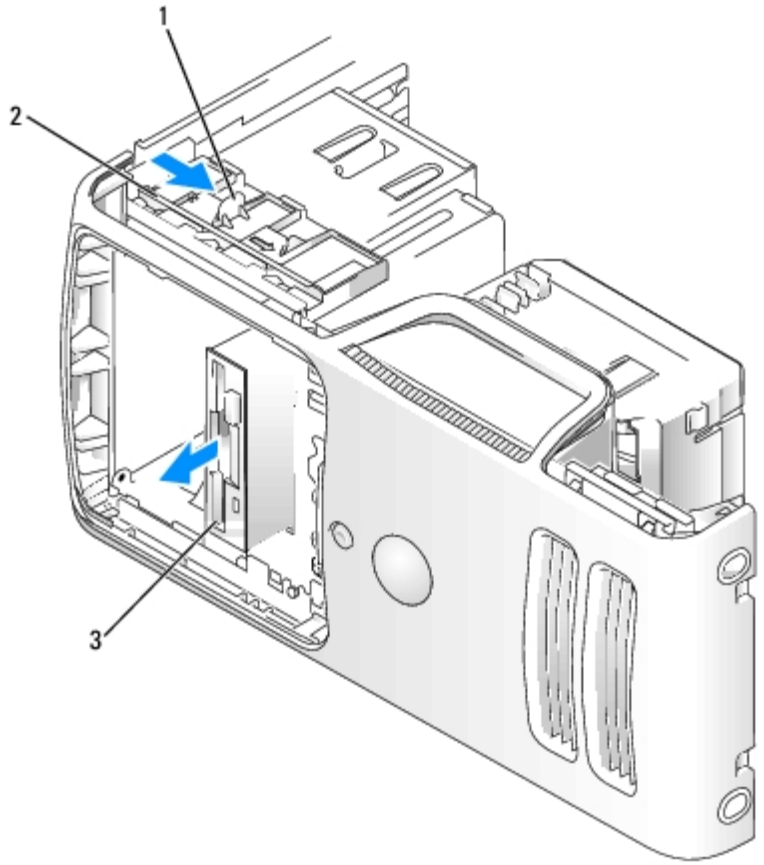


1	power cable	2	data cable

4. Disconnect the power and data cable from the back of the floppy drive. Disconnect the other end of the cable from the floppy connector on the system board (see System Board Components).
5. Remove the data cable from the clip on the processor shroud. Remove the cable from the computer.

NOTE: If you have installed a PCI Express x16 card, this card may cover the floppy-drive connectors. If necessary, remove this card before disconnecting the floppy drive cables (see Removing a PCI Express Card).

6. Slide the drive latch release toward the bottom of the computer, and then slide the floppy drive out through the front of the computer.



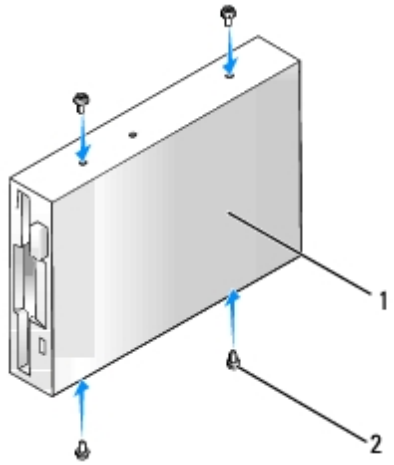
1	drive release latch	2	sliding plate	3	floppy drive

7. If you are not replacing the drive, reinstall the drive panel insert (see Installing the Drive-Panel Insert).
8. If you are not replacing the drive, be sure to reflect these changes in system setup. When you restart your computer, enter system setup (see System Setup), then go to the "Drives" section of the BIOS and under Diskette Drive set the value to **none**.

Installing a Floppy Drive

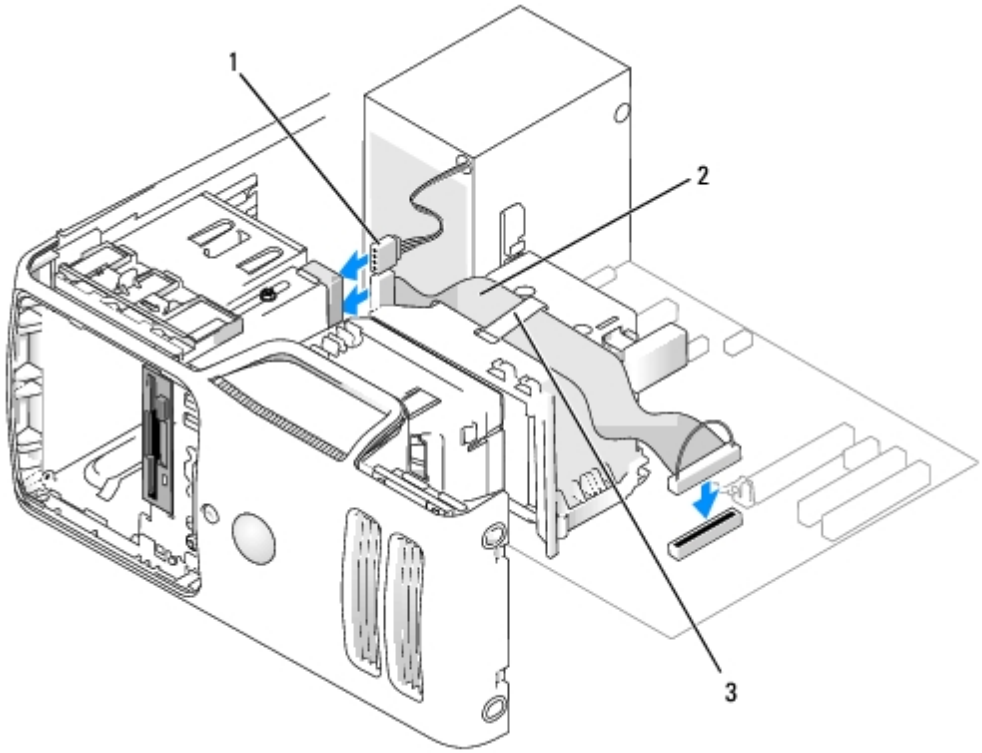
NOTE: In the event that the replacement or new floppy drive does not have shoulder screws, use the shoulder screws located within the drive panel insert. Otherwise, reuse the screws attached to the drive that you are replacing.

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. Remove the drive panel (see Removing the Drive Panel).
4. If this is a new drive installation:
   - Remove the drive panel insert (see Removing the Drive-Panel Insert).
   - Remove the four shoulder screws from the insert.
   - Install two of the shoulder screws on each side of the drive.



1	floppy drive	2	shoulder screws (4)

5. Gently slide the drive into place until you feel a click or feel the drive securely installed.
6. Attach the power and data cables to the floppy drive.
7. Connect the other end of the data cable to the connector labeled "FLOPPY" on the system board (see System Board Components) and route the cable through the clip on the processor shroud.



1	power cable	2	data cable	3	processor shroud clip

8. Check all cable connections, and fold cables out of the way to avoid blocking airflow between the fan and cooling vents. Insert the floppy data cable into the clip on top of the processor shroud.
9. Replace the drive panel (see Installing the Drive Panel).
10. Replace the computer cover (see Replacing the Computer Cover).

NOTICE: To connect a network cable, first plug the cable into the network device and then plug it into the computer.

11. Connect your computer and devices to their electrical outlets, and then turn them on.

    See the documentation that came with the drive for instructions on installing any software required for drive operation.

12. Enter system setup (see System Setup) and select the appropriate **Diskette Drive** option.

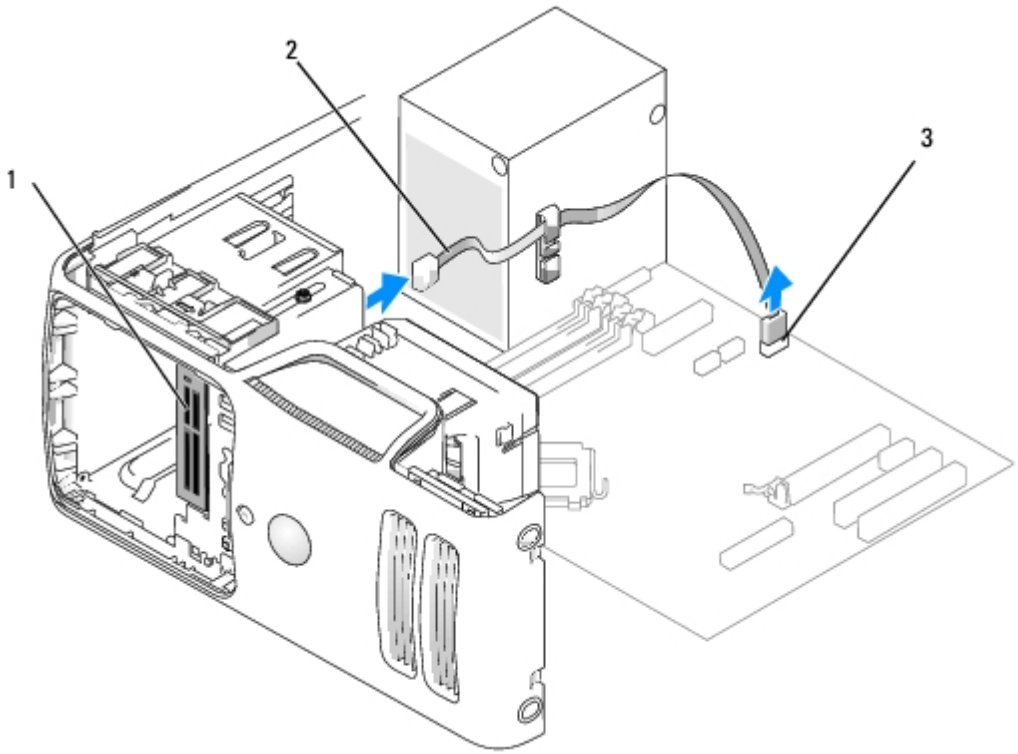
Media Card Reader

Removing a Media Card Reader

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

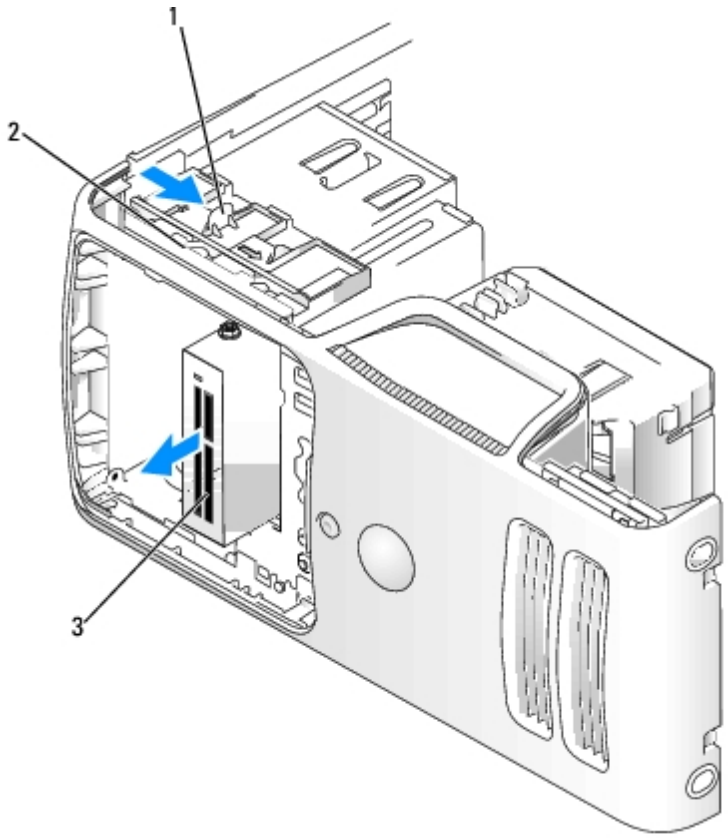
NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. Remove the drive panel (see Removing the Drive Panel).



1	Media Card Reader (optional)	2	cable	3	USB connector

4. Disconnect the USB cable from the back of the Media Card Reader. Disconnect the other end of the cable from the USB connector on the system board (see System Board Components). Remove the cable from any clips and lift out of the computer.



1	drive release latch	2	sliding plate	3	Media Card Reader

5. Pull the sliding plate to the right, then slide the drive out the front of the computer.
6. Replace the drive panel insert, as needed (see Installing the Drive-Panel Insert).
7. Replace the drive panel (see Installing the Drive Panel).
8. Replace the computer cover (see Replacing the Computer Cover).
9. Power up the system and enter system setup (see System Setup). Set the USB for FlexBay value to **OFF**.

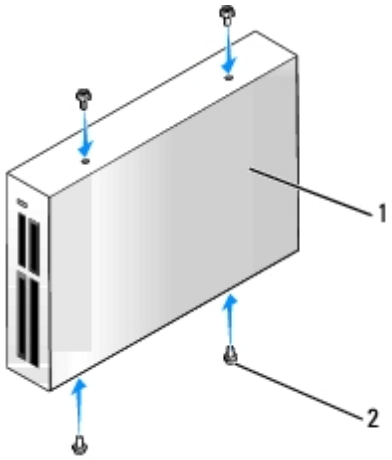
Installing a Media Card Reader

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. Remove the drive panel (see Removing the Drive Panel).
4. Remove the drive panel insert (see Removing the Drive-Panel Insert). Remove the four shoulder screws from the drive panel insert.
5. Remove the Media Card Reader from its packaging.
6. Remove the shoulder screws from the inside of the drive-panel insert and attach the screws to the new Media Card

Reader.

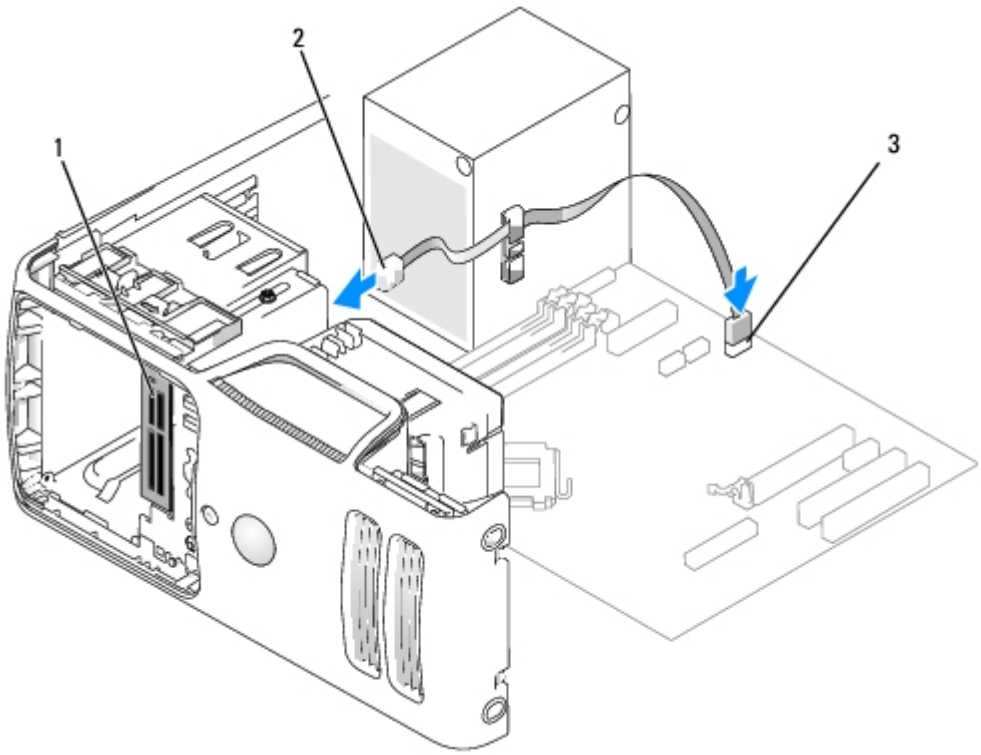


1	Media Card Reader	2	screws (4)

7. Gently slide the Media Card Reader into place until you feel a click or feel the drive securely installed.

   Ensure that the Media Card Reader is installed before the FlexBay cable is connected.

8. Connect the USB cable to the back of the Media Card Reader and to the USB connector on the system board (see System Board Components).



1	Media Card Reader	2	USB cable	3	USB connector

9. Route the USB cable through the cable routing clip.
10. Replace the computer cover (see Replacing the Computer Cover).
11. Power up the system and enter system setup (see System Setup). Set the USB for FlexBay value to **ON**.

CD/DVD Drive

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

Removing a CD/DVD Drive

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. Remove the drive panel (see Removing the Drive Panel).
4. Disconnect the power cable and the CD/DVD drive cable from the back of the drive and the system board.

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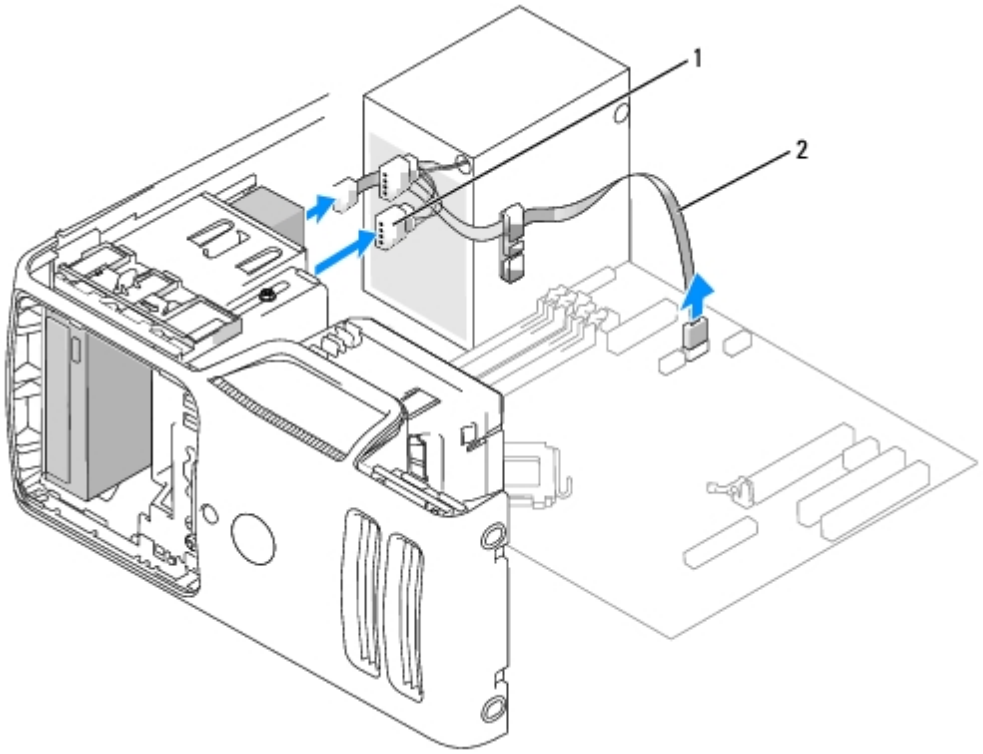
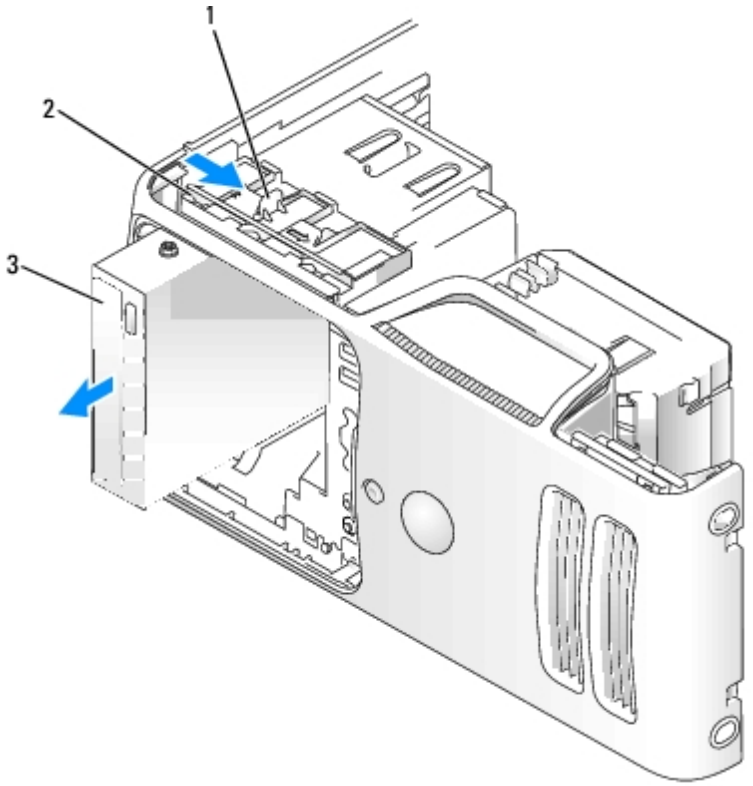


1	power cable	2	data cable

5. Slide the drive release mechanism to the right to release the shoulder screw, and then slide the drive out to remove it from the drive bay.
6. If you are not replacing the drive, replace the drive panel insert (see Installing the Drive-Panel Insert.
7. Replace the drive panel (see Installing the Drive Panel).
8. Replace the computer cover (see Replacing the Computer Cover.
9. If you are removing and not replacing this drive, be sure to disable the drive in system setup. When you restart your computer, enter system setup (see System Setup), then go to the "Drives" section of the BIOS and under SATA 0 through 5, set the SATA ports to the correct configuration.

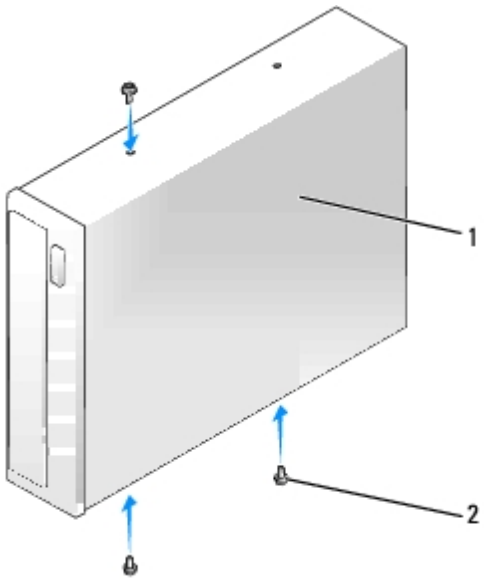


1	drive release latch	2	sliding plate	3	CD/DVD drive

Installing a CD/DVD Drive

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. If you are installing a new drive, unpack the drive and prepare it for installation.

   Check the documentation that accompanied the drive to verify that the drive is configured for your computer.
4. If you are installing a new drive, remove the drive panel insert (see Removing the Drive-Panel Insert), then remove three shoulder screws from the inside of the drive-panel insert and attach the screws to the new drive.
5. Slide the drive into the drive bay until the drive clicks into position.



1	CD/DVD drive	2	screws (3)

6. Connect the power cable to the drive.
7. Connect the CD/DVD data cable to the drive and to the SATA4 connector on the system board (see System Board Components).

NOTE: If you are installing a second CD/DVD drive connect the data cable to SATA5.

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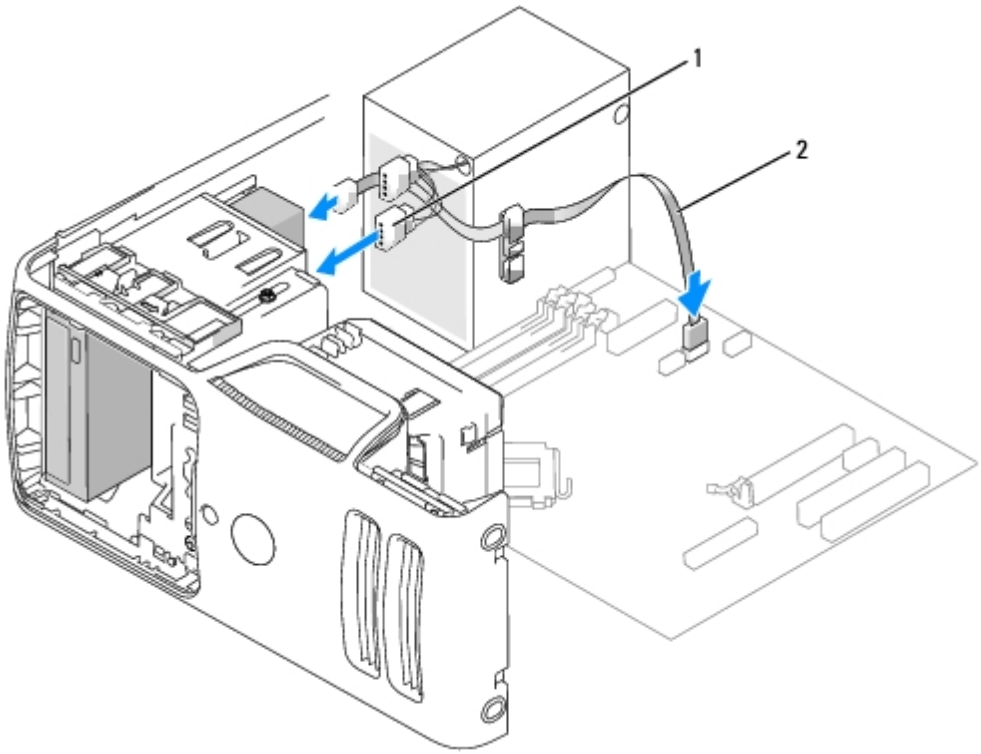


1	power cable	2	data cable

8. Check all cable connections, and fold cables out of the way to avoid blocking airflow between the fan and cooling vents.

9. Replace the drive panel (see Installing the Drive Panel).
10. Replace the computer cover (see Replacing the Computer Cover).

NOTICE: To connect a network cable, first plug the cable into the network device and then plug it into the computer.

11. Connect your computer and devices to their electrical outlets, and then turn them on.
12. When you restart your computer, enter system setup (see System Setup), then go to the "Drives" section of the BIOS and under SATA 0 through 5, enable the SATA port for this drive.

    See the documentation that came with the drive for instructions on installing any software required for drive operation.

Battery

Replacing the Battery

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

A coin-cell battery maintains computer configuration, date, and time information. The battery can last several years.

If you have to repeatedly reset time and date information after turning on the computer, replace the battery.

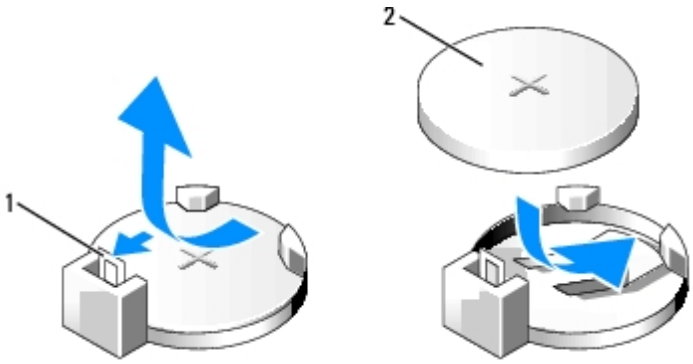
CAUTION: A new battery can explode if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

To replace the battery:

1. Record all the screens in system setup (see System Setup) so that you can restore the correct settings in step 9.
2. Follow the procedures in Before You Begin.
3. Remove the computer cover (see Removing the Computer Cover).
4. Locate the battery socket (see System Board Components).

NOTICE: If you pry the battery out of its socket with a blunt object, be careful not to touch the system board with the object. Ensure that the object is inserted between the battery and the socket before you attempt to pry out the battery. Otherwise, you may damage the system board by prying off the socket or by breaking circuit traces on the system board.

5. Remove the battery by carefully prying it out of its socket with your fingers or with a blunt, nonconducting object such as a plastic screwdriver.
6. Insert the new battery into the socket with the side labeled "+" facing up, then snap the battery into place.



1	battery release lever	2	battery (positive side)

7. Replace the computer cover (see Replacing the Computer Cover).

NOTICE: To connect a network cable, first plug the cable into the network device and then plug it into the computer.

8. Connect your computer and devices to electrical outlets, and then turn them on.
9. Enter system setup (see System Setup) and restore the settings you recorded in step 1.
10. Properly dispose of the old battery.

    See the *Product Information Guide* for battery disposal information.

Power Supply

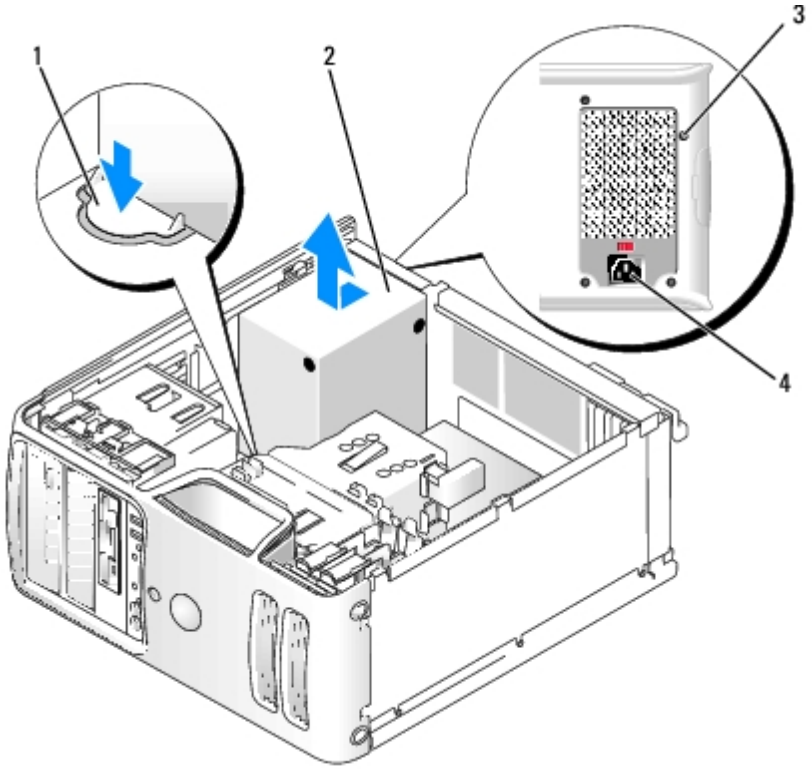
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

Removing the Power Supply

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. Disconnect the DC power cables from the system board and the drives.

NOTICE: Note the routing of the DC power cables underneath the tabs in the computer frame as you remove them from the system board and drives. You must route these cables properly when you replace them to prevent them from being pinched or crimped.

4. Remove any cables from the cable routing clip on the power supply.
5. Remove the four screws that attach the power supply to the back of the computer frame.
6. Press the release tab located on the floor of the computer frame.
7. Slide the power supply approximately 1 inch towards the front of the computer.
8. Lift the power supply out of the computer.



1	release tab	2	power supply	3	screws (4)
4	AC power connector				

Installing the Power Supply

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

1. Slide the power supply into place.
2. Replace the four screws that secure the power supply to the back of the computer frame.
3. Reconnect the DC power cables.
4. Run the cables underneath the clips, and press the clips to close them over the cables.
5. Replace the computer cover (see Replacing the Computer Cover).

NOTICE: To connect a network cable, first plug the cable into the network port or device and then plug the cable into the computer.

6. Connect your computer and devices to electrical outlets, and then turn them on.

Processor

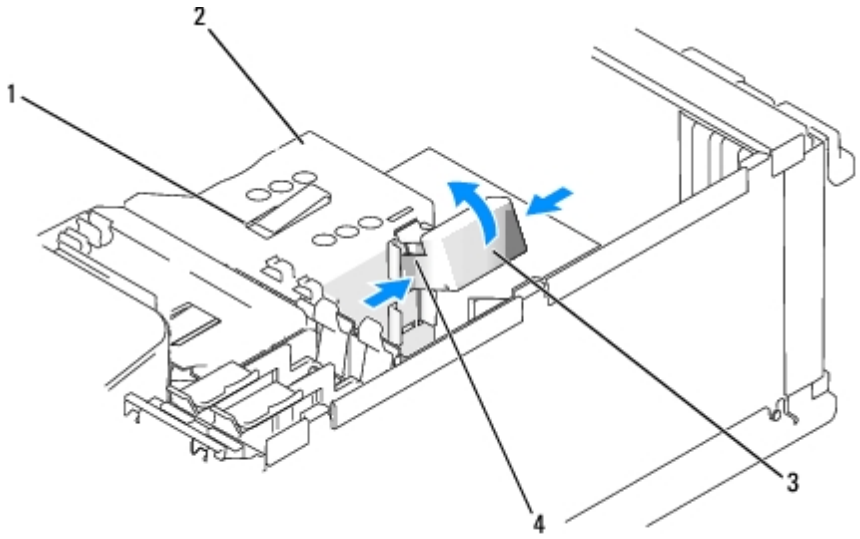
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: The heat sink assembly, power supply, and other components may be very hot during normal operation. Be sure that they have had sufficient time to cool before you touch them.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer.

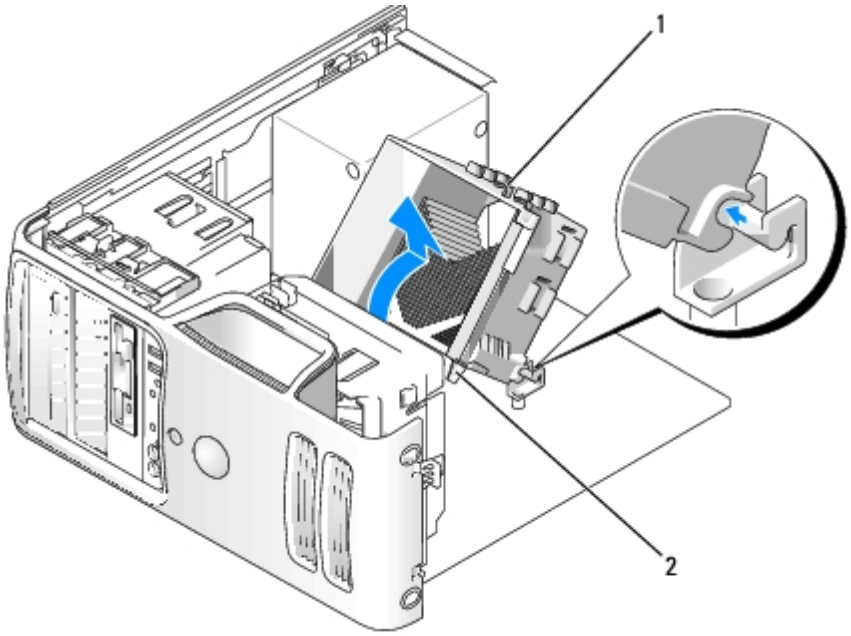
Removing the Processor

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Front View of the Computer).
3. If your computer includes a card retention mechanism, to secure the x16 card in place from the top:
    a. Pivot the mechanism upward and gently squeeze in on the sides to release the mechanism from the two tab slots holding it in place.
    b. Set the retention mechanism aside.
4. Unhook the floppy drive cable from the clip on the processor shroud and move it out of the way.



1	floppy cable clip	2	processor shroud	3	card retention mechanism
4	release tabs (2)				

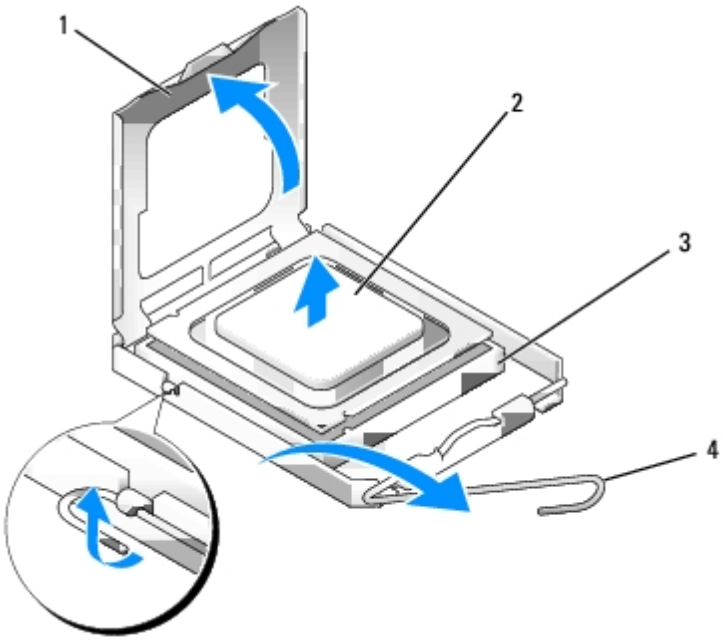
5. Using a long Phillips screwdriver, loosen the two captive screws, one on each side of the plastic heat sink assembly shield.
6. Rotate the heat sink assembly toward the rear of the computer, and then lift it from the computer.



1	heat sink and fan shroud assembly	2	captive screw housing (2)

NOTICE: If you are installing a processor upgrade kit from Dell, discard the original heat sink. If you are *not* installing a processor upgrade kit from Dell, reuse the original heat sink when you install your new processor.

7. At the processor, place your finger upon the hook end of the release lever, then push down and out to release it from the tab that secures it.



1	processor cover	2	processor	3	processor socket
4	release lever				

8. Release the release lever and lift the processor cover.
9. Gently remove the processor from the socket.

Leave the release lever extended in the release position so that the socket is ready for the new processor.

Installing the Processor

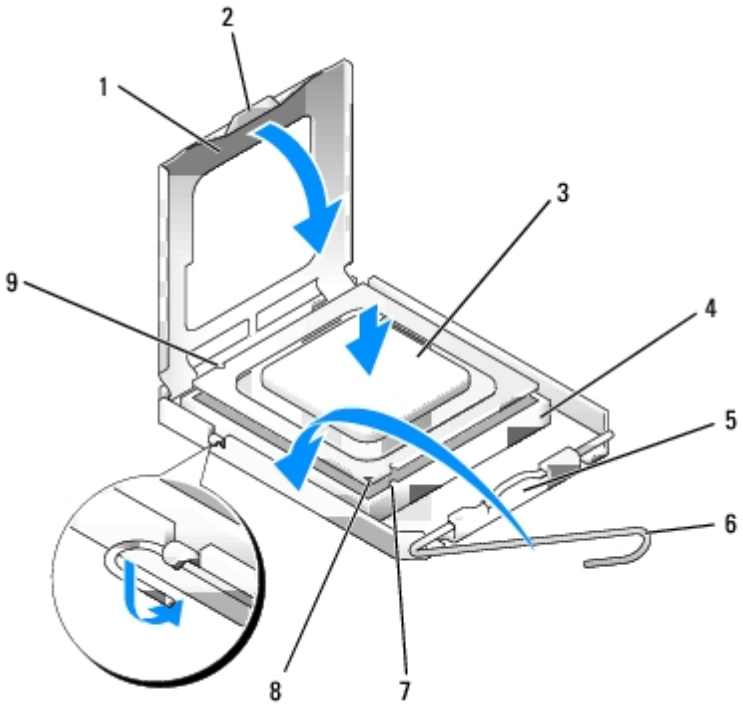
NOTICE: Ground yourself by touching an unpainted metal surface on the back of the computer.

NOTICE: When replacing the processor, do not touch any of the pins inside the socket or allow any objects to fall on the pins in the socket.

1. Unpack the new processor, being careful not to touch the underside of the processor.

NOTICE: You must position the processor correctly in the socket to avoid permanent damage to the processor and the computer when you turn on the computer.

2. If the release lever on the socket is not fully extended, move it to that position.
3. Orient the front and rear alignment notches on the processor with the front and rear alignment notches on the socket.
4. Align the pin-1 corners of the processor and socket.



1	processor cover	2	securing tab	3	processor
4	processor socket	5	center cover latch	6	release lever
7	front alignment notch	8	socket and processor pin-1 indicator	9	rear alignment notch

NOTICE: To avoid damage, ensure that the processor aligns properly with the socket, and do not use excessive force when you install the processor.

5. Set the processor lightly in the socket and ensure that the processor is positioned correctly.
6. When the processor is fully seated in the socket, close the processor cover.

Ensure that the securing tab on the processor cover is positioned underneath the center cover latch on the socket.

7. Pivot the socket release lever back toward the socket and snap it into place beneath the securing tab.

NOTICE: If you are *not* installing a processor upgrade kit from Dell, reuse the original heat sink assembly when you replace the processor.

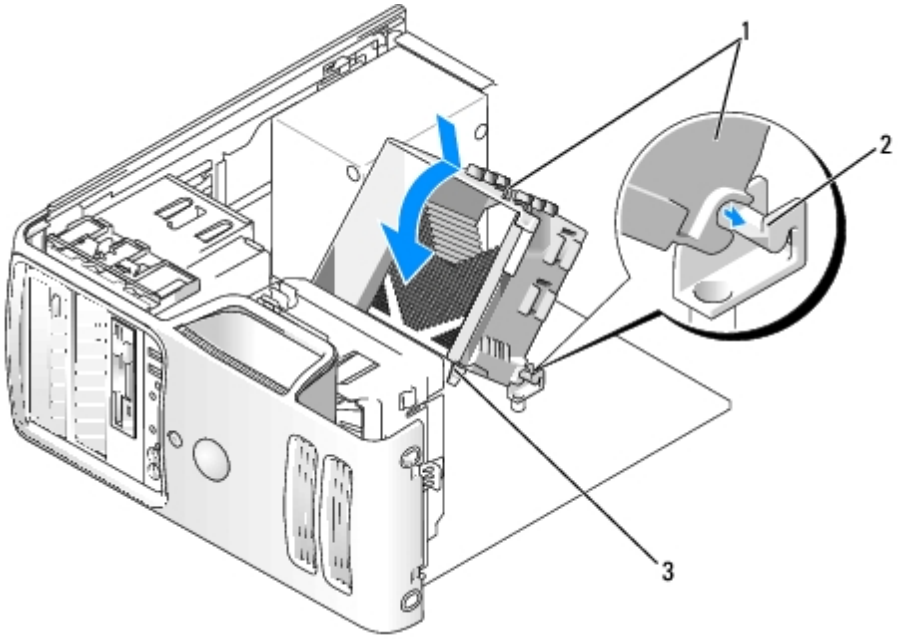
If you installed a processor replacement kit from Dell, return the original heat sink assembly and processor to Dell in the same package in which your replacement kit was sent.

8. Install the heat sink assembly:

   a. Place the heat sink assembly back onto the heat sink assembly bracket.

   b. Rotate the heat sink assembly down towards the computer base and tighten the two captive screws.

9. Place the floppy ribbon cable back across the top of the processor shroud, inserting the cable under the clip. Ensure that the cable does not block airflow from the fan and cooling vents.



1	heat sink and fan shroud assembly	2	heat sink assembly bracket	3	captive screw housing (2)

10. Replace the computer cover (see Replacing the Computer Cover).

NOTICE: To connect a network cable, first plug the cable into the network port or device and then plug the cable into the computer.

11. Connect your computer and devices to electrical outlets, and then turn them on.

I/O Panel

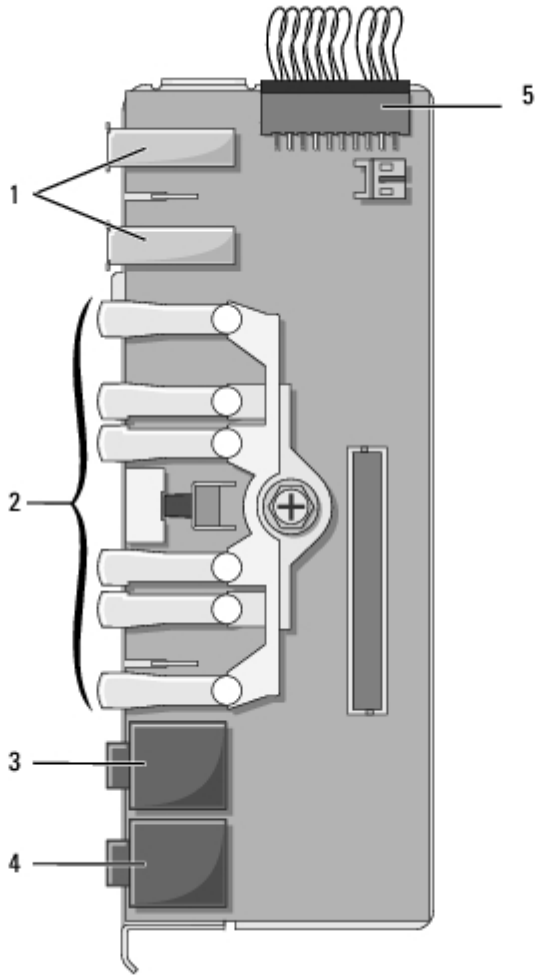
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before opening the cover.

CAUTION: The heat sink assembly, power supply, and other components may be very hot during normal

operation. Be sure that they have had sufficient time to cool before you touch them.

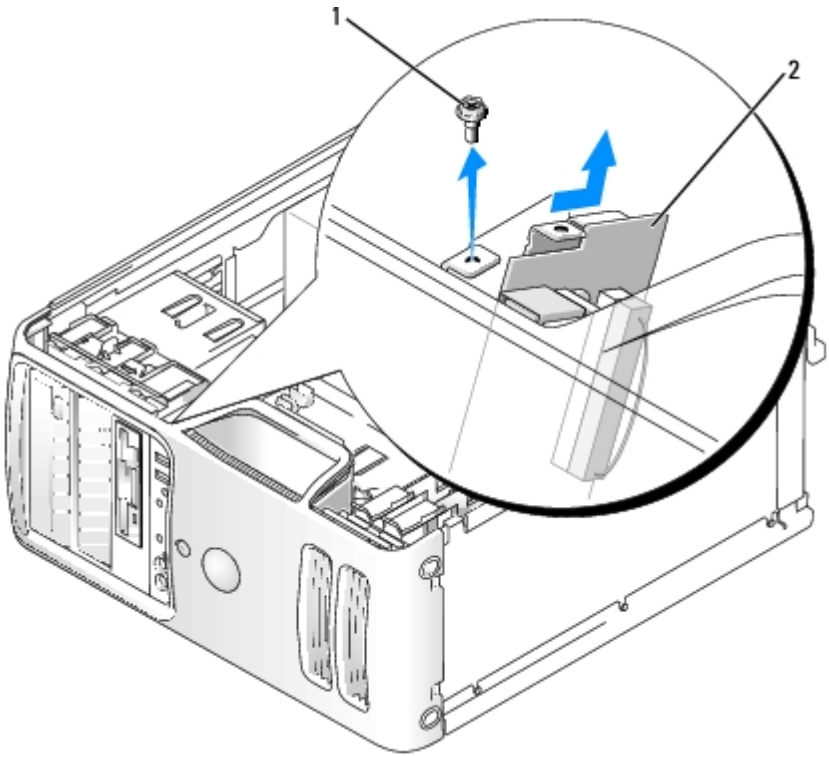
I/O-Panel Components



1	USB port	2	diagnostic, hard drive activity, and network lights	3	headphone connector
4	microphone connector	5	integrated audio connector with jumper block		

Removing the I/O Panel

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Front View of the Computer).
3. Remove the mounting screw from the top of the I/O panel.
4. Remove the I/O panel from the computer by sliding it towards the back of the computer. Slide it back far enough to access the control panel cable.
5. Disconnect the control panel cable from the I/O panel connector.



1	mounting screw	2	I/O panel

Installing the I/O Panel

Follow the removal procedure (Removing the I/O Panel) in reverse order.

- If the old I/O panel has a jumper block, move it to the new I/O panel, unless the new one comes with a jumper block.
- If the old I/O panel has no jumper block, then remove it from the new I/O panel if it comes with one.

When you slide the I/O panel back into the front panel, ensure all the I/O panel connectors fit into their spaces on the front panel.

Processor Fan

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before opening the cover.

CAUTION: The heat sink assembly, power supply, and other components may be very hot during normal operation. Be sure that they have had sufficient time to cool before you touch them.

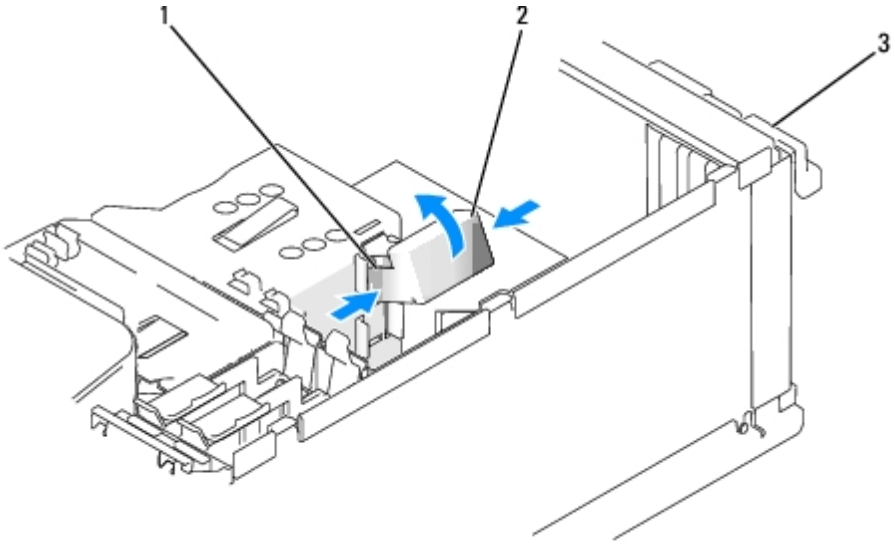
Removing the Processor Fan

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. If your computer includes a card retention mechanism to secure the x16 card in place:

a. Pivot the mechanism upward and gently squeeze in on the sides to release the mechanism from the two tab slots holding it in place.

b. Set the retention mechanism aside.

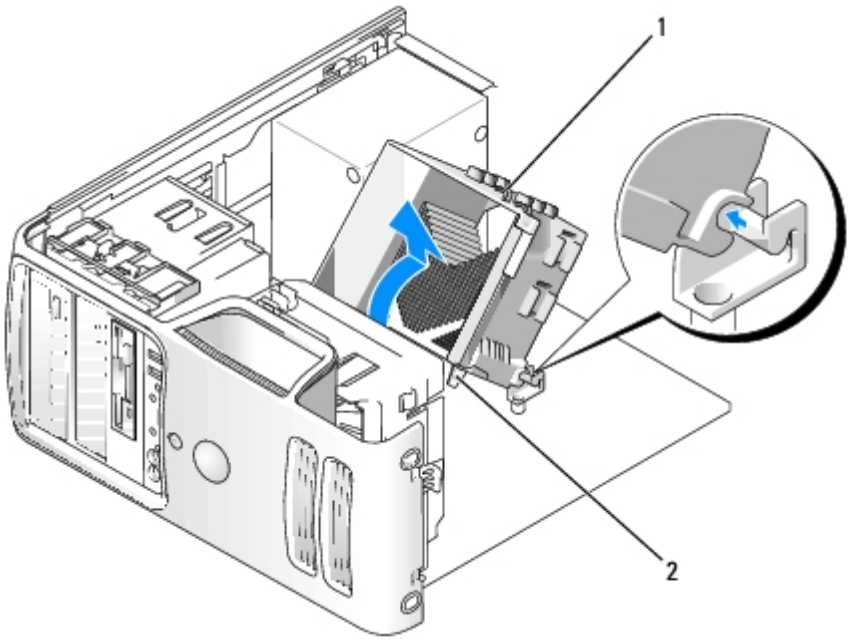
4. Unhook the floppy drive cable from the clips on the processor shroud and move it out of the way.



1	release tab	2	card retention mechanism	3	card retention door

5. Use a long Phillips screwdriver to loosen the two captive screws, one on each side of the heat sink assembly.

6. Rotate the heat sink assembly towards the rear of the computer, and then remove it from the computer.

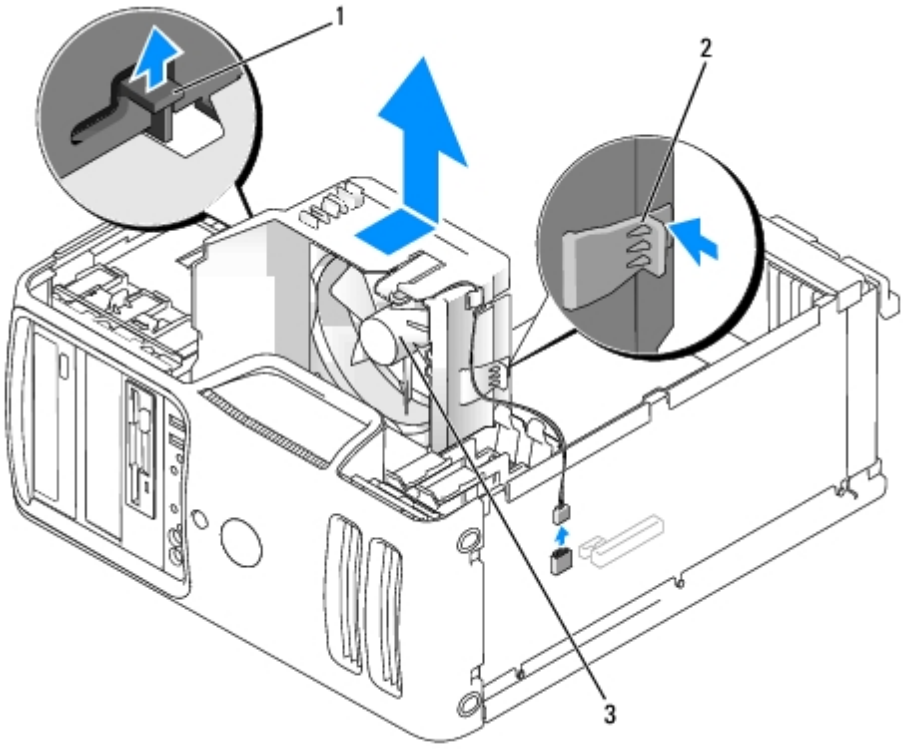


1	heat sink and fan shroud assembly	2	captive screw housing (2)

7. Place the heat sink assembly on its side in a safe place.

8. Disconnect the system fan cable from the system board (see System Board Components).

9. Ensure that all cables have been removed from the routing clips on the top of the system fan assembly.



1	fan release lever	2	fan release lever tab	3	processor fan

10. The fan has two release levers. One on the side facing the hard disk and a smaller one on the opposite side next to the bottom cover. Release both fan levers, then slide the fan toward the back of the computer to release the four fan tabs from the four slots in the bottom cover.

11. Remove the fan from the computer.

Installing the Processor Fan

When reinstalling the fan, ensure that you do not pinch the wires that run between the system board and the fan.

NOTICE: Ensure that the four fan tabs are fully inserted into the four keyhole slots in the bottom cover so that the fan can slide back fully into position. Ensure that the fan release lever tabs are seated into their respective slots.

Follow the fan removal procedure (Removing the Processor Fan) in reverse order.

System Board

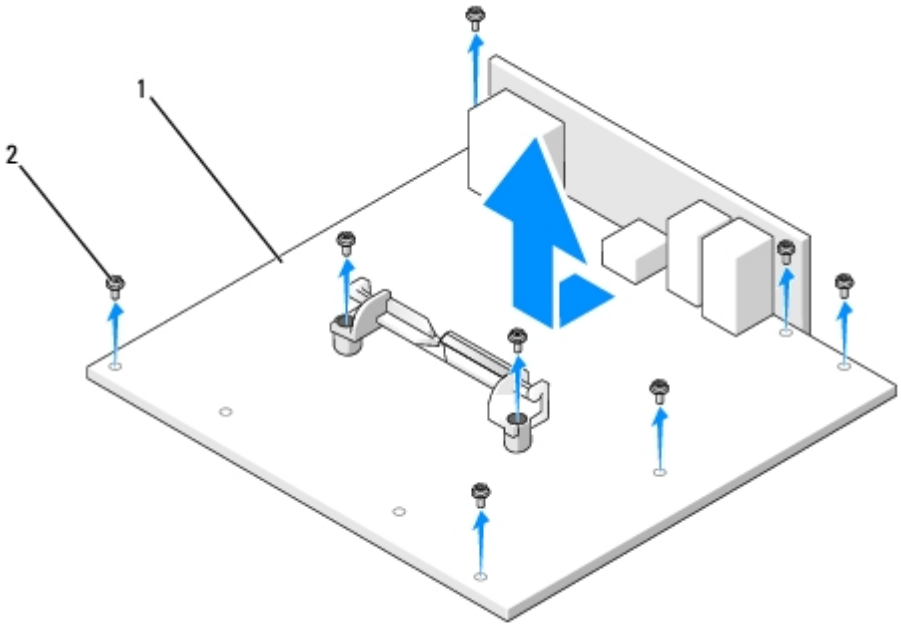
Removing the System Board

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before opening the cover.

CAUTION: The heat sink assembly, power supply, and other components may be very hot during normal operation. Be sure that they have had sufficient time to cool before you touch them.

NOTICE: Before touching anything inside your computer, ground yourself by touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate any static electricity that could harm internal components.

1. Follow the procedures in Before You Begin.
2. Remove the computer cover (see Removing the Computer Cover).
3. Remove any components that restrict access to the system board, such as CD/DVD drives, floppy drive, hard drive, and I/O panel.
4. Remove the heat sink assembly and processor (see Removing the Processor). Store them in a safe static free place.
5. Disconnect all cables from the system board.
6. Remove any memory modules that you are transferring to the new system board (see Removing Memory).



1	system board	2	screws (8)

7. Remove 8 screws that secure the system board. Six of the screws go through the system board and two of the screws go through the heat sink pivot mounted on the system board.
8. Slide the system board assembly toward the front of the computer, and then lift the board out of the computer.
9. Place the system board assembly that you just removed next to the replacement system board to verify that it is identical.

Installing the System Board

1. Gently align the board into the chassis and slide it toward the back of the computer.
2. Replace the 8 screws on the system board.
3. Install the processor and heat sink (see Installing the Processor).
4. Install the memory modules that were removed from the old system board (see Installing Memory).
5. Replace any remaining components components that you removed from the system board.

6. Reconnect all cables to their connectors at the back of the computer.
7. Replace the computer cover (see Replacing the Computer Cover).

NOTICE: To connect a network cable, first plug the cable into the network port or device and then plug the cable into the computer.

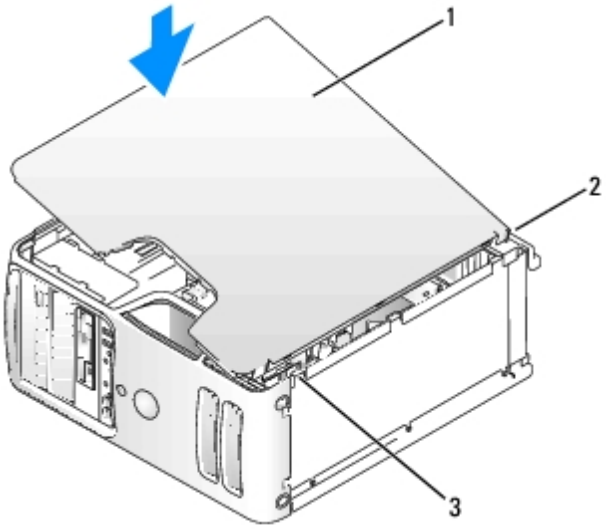
8. Connect your computer and devices to electrical outlets, and then turn them on.

NOTE: If the new system board requires flashing the BIOS, refer to Flashing the BIOS.

Replacing the Computer Cover

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

1. Ensure that all cables are connected. Fold the cables so they are out of the way.
2. Ensure that no tools or extra parts are left inside the computer.
3. Align the bottom of the cover with the tabs located along the bottom edge of the computer.
4. Using the tabs as leverage, rotate the cover downward, and then press down to close it.



1	computer cover	2	back of computer	3	bottom hinges

5. Ensure that the cover is seated correctly before moving the computer to the upright position.

NOTICE: To connect a network cable, first plug the cable into the network device and then plug it into the computer.

6. Connect your computer and devices to electrical outlets, and then turn them on.

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